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The Future of Tax Audits? The Acceptance of Online-Based, Automated Tax Audits and their Effects on Trust and Power

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Abstract

In this paper, we investigate the acceptance by taxpayers and tax auditors of voluntary e-audits, i.e., online-based, automated tax audits. Further, we analyze the effects of e-audits on trust in and power of tax authorities. Perceived benefits and shortcomings of e-audits for taxpayers and tax auditors may depend on the specific features of e-audits, which may not only affect adoption and endorsement but also influence the trust-power balance between taxpayers and tax authorities, ultimately affecting tax compliance. In an experimental survey among taxpayers and tax auditors, we focus on four specific features: data privacy, audit certainty, transparency, and independence from tax intermediaries. Results from multilevel models suggest that taxpayers' acceptance indeed depends on these features, particularly on audit certainty, i.e., that an e-audit cannot be followed by a subsequent conventional tax audit of the same period. While these features appear to increase acceptance and trust by taxpayers, the same features cause concerns of tax auditors, who react with less support for e-audits and a perceived loss in power. These results indicate a mismatch between taxpayers' and tax auditors' perceptions about e-audits and tax compliance. Our study is among the first to investigate the effects of digitalization in tax administration and to include tax auditors' views. Results are relevant to policymakers who wish to promote digitalization to foster tax compliance. Specifically, our study suggests that tax authorities should incorporate safeguards into e-audits and educate about the importance of a trusting relationship between taxpayers and tax auditors.

Keywords

Tax administration, e-government, tax compliance, tax auditors

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The Future of Tax Audits?
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1. Introduction

In this paper, we investigate the acceptance by taxpayers and by tax auditors of voluntary, online-based, automated tax audits (e-audits) and their effects on the perceived power of and trust in tax authorities. Addressing micro and small businesses in particular, such novel e-audit programs may invite taxpayers to regularly upload detailed, standardized accounting data (e.g., ledger and payroll data) to tax authorities' online platforms. Using AI-powered analyses, including statistical methods and algorithms, e-audit programs may then identify outliers, ask for clarification, and subsequently assess income tax automatically and in a timely manner.[1] Thereby, e-audits could extend several e-government programs of tax administration which already exist in various countries, building on e-filing systems such as ELSTER in Germany, e-File in the US, FinanzOnline in Austria, or myTax in Australia.

Automation of tax audits is the foreseeable and probably unavoidable next step in the digitalization efforts of tax administrations for several reasons. First, tax authorities may be increasingly compelled to develop e-audit programs to reduce personnel costs and increase audit efficiency. Government statistics show a steady rise in the number of enterprises (see also OECD, 2019; by 13% between 2007 and 2018; Statistik Austria, 2020), while the number of employees in tax authorities continuously decreases (by 6% in the same period in Austria; Bundesministerium für öffentlichen Dienst und Sport, 2019). Clarification of whether and under which conditions taxpayers are willing to accept e-audits is thus crucial for the future development of tax administration.

Second, e-audits can be seen as an expansion of the concept of cooperative compliance, which is characterized by increased transparency between taxpayers and tax authorities and which aims to provide more timely certainty and to reduce administrative costs for both taxpayers and tax authorities (OECD, 2013). However, cooperative compliance was originally designed for large businesses, whereas e-audits address in particular medium, small, and micro businesses that normally face a low audit probability.

Third, e-audits may be regarded as a large-scale application and enhancement of computational and AI-based analysis of taxpayer data, which are already employed by tax authorities around the world to augment conventional tax audits (Centre for Public Impact, 2018; Hashimzade, Myles and Rablen, 2016; OECD, 2019). E-audits can be expected to expand these already existing methods: They extend e-filing systems by the possibility to upload granular business data, they apply concepts of cooperative

[1] This approach differs from the Standard Audit File – Tax (SAF-T), developed by the OECD (2005) and implemented in Austria in 2009, whose only intention was to standardize data exchange between taxpayers and tax authorities during a conventional ex-post audit.

compliance to a much wider range of businesses, and they extend the statistical analysis of taxpayer data to much more granular data.

Because e-audits constitute a paradigm shift in tax collection, voluntary utilization is likely to be the first step in their implementation. In the long term, and when voluntary adoption is successful, e-audits may become mandatory. Successful implementation of e-audits thus requires broad acceptance, both from taxpayers and from tax auditors. In many countries, small and micro businesses are audited only rarely. Hence, switching to continuous, full disclosure of granular data constitutes a major disruption and a drastic increase in taxpayer supervision, which may be met with resistance. Furthermore, conventional tax audits still rely predominantly on the experience of and assessments by human tax auditors. Both taxpayers and tax auditors may thus have little faith in results from the automatic analysis of taxpayer data.

On the other hand, e-audits promise benefits both to taxpayers and tax authorities. First, as in cooperative compliance, continuous monitoring and instantaneous feedback upon uploading data may increase certainty, preventing unexpected tax payments and unintentional non-compliance. Second, conventional filing of tax returns and subsequent tax audits cause administrative costs both for taxpayers and tax authorities. E-audits may improve efficiency for both sides by shifting some of the administrative burden to automated systems. Lastly, e-audits dramatically increase audit coverage all taxpayers utilizing the system, allowing tax authorities to focus their resources on non-compliant taxpayers.

However, it is unclear if these possible benefits outweigh concerns about data privacy and audit accuracy so that both taxpayers and tax auditors will broadly accept and utilize e-audits. Nonetheless, acceptance of e-audits by taxpayers and tax auditors appears extremely relevant for their successful implementation. Low acceptance may not only threaten the utilization of e-audits but also disrupt other digitization efforts within tax authorities as well as the overall relationship between taxpayers and tax authorities.

With regard to the relationship between taxpayers and tax authorities, e-audits could also strongly affect the perceived power of and trust in tax authorities, which are the two main determinants of tax compliance as described in the slippery slope framework (Kirchler, Hoelzl and Wahl, 2008). On the one hand, the use of (e-government) services has been linked to higher trust in government and tax authorities (Gangl *et al.*, 2013; Tolbert and Mossberger, 2006). E-audits can thus be expected to increase trust in tax authorities. On the other hand, governments have an inherent interest in obtaining citizens' data (Fusi, 2020). Tax authorities may wish to facilitate the collection of taxpayer data, enabling data-driven auditing to increase audit case selection and audit efficiency (OECD, 2016a, 2019). E-audits may thus be expected to shift the power balance in favor of tax authorities.

Trust and power are interdependent (see Kirchler, Hoelzl and Wahl, 2008). One feature of e-audits that increases power may have a detrimental impact on trustworthiness, and vice versa. For example, taxpayers may perceive e-audits as a disproportionate invasion of privacy, which could reduce their trust. Tax auditors, on the other hand, may expect deliberate misuse of e-audits by taxpayers. This,

in turn, may be seen as a loss in power to enforce tax compliance. As trust and power have repeatedly shown to be linked to tax compliance of citizens (e.g., Batrancea *et al.*, 2019; Kogler, Muehlbacher and Kirchler, 2015), it appears important that e-audits do not negatively affect the trust-power balance between governments and taxpayers.

Despite an increase in digitalization of tax administration, there are very few studies on e-governance programs in the context of taxation (Carter *et al.*, 2011; Floropoulos *et al.*, 2010; Gotoh, 2009; Hung, Chang and Yu, 2006; Stafford and Turan, 2011). In this study, we bridge this research gap by assessing the determinants influencing e-audit utilization and the effects of e-audits on the perceived trustworthiness and power of tax authorities among taxpayers and tax auditors.

In an experimental questionnaire, we survey 331 business taxpayers and 530 tax auditors, presenting on screen randomly generated variations of a hypothetical but highly realistic e-audit program.[2] The Austrian Ministry of Finance, the Austrian Chamber of Commerce, and the Federation of Austrian Industries supported this study by distributing the questionnaires and by providing feedback on the operationalization of e-audits and their features. The basic description of e-audits is constant across all variations and can be summarized as follows: Taxpayers can opt to upload data to tax authorities' online platforms, which then automatically conduct tax audits, generate inquiries, if necessary, and finally assess the tax due. As randomized treatments, the presented e-audit programs vary in four distinct features, which are closely related to increased surveillance and cooperative compliance.

The features, which are presented as either available or unavailable to participants, are: a) *data privacy*, which is operationalized as the deletion of uploaded data as soon as an e-audit is concluded or aborted, b) *audit certainty*, operationalized as the prohibition of conventional follow-up tax audits for periods that already underwent a successful e-audit, c) *transparency*, operationalized as a detailed explanation on how the audit result was generated, and d) *independence*, operationalized as the option to utilize the e-audit process without the help of a tax intermediary. We identify these features based on interviews with representatives of the Austrian Ministry of Finance. As all four features are closely related to recent developments in tax administration, we expect them to be particularly important. Moreover, we expect all four features to be decisive for the acceptance of e-audits as well as perceived trust in and power of tax authorities.

To capture the acceptance of e-audits by taxpayers and tax auditors, we inquire about the behavioral intention to utilize (for business owners), to use or recommend utilization (for business employees), or to endorse implementation (for tax auditors) of the presented e-audit program. Moreover, we inquire about the perceived change in tax authorities' power to enforce tax compliance and the perceived change in their trustworthiness. Each participant could respond to up to five rounds of e-audit programs with randomly generated combinations of features. Our research design allows us to assess

[2] The hypothetical e-audit process used in this study is based on a program currently in development by the Austrian Ministry of Finance. We base the operationalization of e-audits and their features on in-depth interviews with representatives of the Austrian Ministry of Finance.

both between-subject effects, i.e., the effect of the average treatment manifestation across participants, as well as within-subject effects, i.e., the effect of a change in treatments across rounds. The disaggregation of between- and within-subject effects enables us to test both the ad-hoc reactions to the availability of the four presented features, as well as the effects of a more deliberate comparison between their availability across rounds.

With regard to behavioral intention, we find that, on average across all treatment manifestations, taxpayers indicate a 36% probability of using e-audits, while tax auditors indicate a 46% probability of endorsing e-audit implementation. With regard to perceived changes in trust and power, taxpayers express a significant overall increase in perceived power of tax authorities through e-audits and a minor but significant decrease in trust in tax authorities across all presented variants of e-audits. Tax auditors perceive the opposite: they indicate a significant decrease in authorities' power and a significant increase in the perceived trustworthiness of tax authorities.

Of the four experimental features, audit certainty contributes most to explaining behavioral intention, as well as to explaining the perceived changes in trust and power. On the side of taxpayers, audit certainty significantly increases behavioral intention and trust in the tax authorities, with no significant effect on perceived power. On the side of auditors, however, audit certainty significantly decreases behavioral intention as well as the perceived power of the tax authorities, with no significant effect on trust. We find these results as the effect of the average treatment manifestation (between-subjects effect), suggesting that these effects are the result of ad-hoc reactions to the availability of audit certainty. We also find these results as the effect of changes in treatment manifestation across rounds (within-subjects effect), i.e., of comparing the availability of audit certainty across rounds. Taxpayers also significantly prefer e-audits with available data privacy, transparency, and independence, as captured by the within-subject effects.

These results suggest strongly opposing views between taxpayers and tax auditors. Differences in reactions caution against implementing e-audits without considering both perspectives. On the side of taxpayers, the service character of e-audits appears particularly important. Implementing e-audits without direct benefits for taxpayers may be a missed opportunity to foster trust and compliance. On the other hand, tax auditors express considerable concern that such concessions may sacrifice power to detect tax evasion. In order to successfully implement e-audits, safeguards might thus be needed to alleviate these concerns. It also seems necessary to further analyze and better communicate the potential trust-related benefits and the actual risk of tax evasion due to e-audits.

This study is the first, to the best of our knowledge, to examine under which conditions both taxpayers and tax auditors accept e-audits and how they may foster trust and power – important determinants of tax compliance – in the long run. Our study contributes to the literature in two important ways: It provides insights into novel approaches of tax collection and under which circumstances they can be successful. Our results underscore the importance of service-based measures such as cooperative compliance to foster tax compliance. Moreover, this study allows a direct comparison of taxpayers' and

tax auditors' reactions to e-audits, showing that concerns about compliance and services differ considerably between the two groups. Results should thus be of particular interest to tax authorities, informing digitalization efforts that improve efficiency without jeopardizing trust. Our results may also extend to other online and e-governance services, in which similar concerns about compliance and the trust-power balance may apply, for instance, insurance, healthcare, or employment.

2. Background and hypotheses development

2.1 Trust and power in tax administration

Economic models of tax compliance assume that citizens act egoistically and purely based on financial motivations when paying taxes. According to these early models, high audit probability and fines are thus the most important way to ensure tax compliance (Allingham and Sandmo, 1972). However, Allingham and Sandmo acknowledge that their model "*…may perhaps be criticized for giving too little attention to nonpecuniary factors in the taxpayer's decision on whether or not to evade taxes.*" Indeed, subsequent research has shown that tax compliance is determined by a variety of factors, including social influence (e.g. Bobek, Hageman and Kelliher, 2013; Jimenez and Iyer, 2016), personal and cultural differences (Hofmann *et al.*, 2017; Torgler and Schneider, 2007), and the perceived behavior and trustworthiness of tax authorities (e.g. Cherney, 1997; Feld and Frey, 2002; Murphy, 2004).

Building on this increasing evidence that economic considerations alone cannot explain citizens' tax compliance, Kirchler et al. (2008) developed the "slippery slope framework" (SSF) of tax compliance. The SSF integrates two contrasting motivations to comply with tax laws, distinguishing between voluntary and enforced motivations: Voluntary tax compliance stems from a sense of duty and a moral obligation towards society; enforced tax compliance stems from egoistic considerations and is mainly motivated by coercion (i.e., audits and fines). While the former subsumes determinants of tax compliance that are not based on financial and egoistic motivations, the latter mirrors the predictions of the economic models of tax compliance as outlined above.

The SSF relates these two compliance motivations to the behavior of tax authorities, namely perceptions of their trustworthiness and power. Perceived power is described as the result of efficient detection of and strict penalties for tax evasion. Trust, on the other hand, is the result of fair procedures, adequate services, and benevolent conduct by the tax authorities.

According to the SSF, in an interaction climate in which coercion (i.e., power) is the dominant strategy to increase tax compliance ("antagonistic climate"), taxpayers will be driven predominantly by egoistic motivations. In line with economic models of tax compliance, taxpayers will rationally maximize their income whenever possible, only complying if there is sufficient threat of audits and fines, which results in enforced tax compliance. However, as tax audits are costly, the SSF implies that it is inefficient for tax authorities to only rely on power to maximize tax compliance (Kirchler, Hoelzl and Wahl, 2008). In a trusting relationship ("synergistic climate"), taxpayers are more likely to consider taxes as a fair contribution to the public good, which results in voluntary tax compliance. However, a

fair amount of power of tax authorities still has to be present. As neither power nor trust alone can ensure an optimal level of tax compliance in the population, the SSF suggests a balanced combination of trust and power.

The main predictions of the SSF, namely that trust leads to voluntary compliance and power to enforced compliance, have already been subject to extensive empirical testing (Batrancea *et al.*, 2019; Kirchler, Kogler and Muehlbacher, 2014; Kogler *et al.*, 2013; Kogler, Muehlbacher and Kirchler, 2015; Muehlbacher and Kirchler, 2010; Muehlbacher, Kirchler and Schwarzenberger, 2011), with all cited studies consistently supporting the predictions.

Current developments in tax administration show a global trend towards tax administrations, incorporating both trust and power in their approaches to tax collection. For example, in 2017, more than two thirds of the countries included in the 2019 Tax Administration Report (OECD, 2019) had initiatives in place to enhance the quality of their services for taxpayers. Furthermore, an increasing number of tax administrations reported the use of automated AI-based or statistical methods for the purpose of risk management, with data for such analysis coming from internal (e.g. tax declarations, cash register systems) and external sources (e.g., third parties such as other state agencies).

As a prominent example of novel trust-based approaches to foster tax compliance, many jurisdictions offer cooperative compliance programs, which were originally developed for large businesses. In such programs, taxpayers commit to acting transparently towards tax authorities by disclosing relevant tax-related information and accounting data. To further ensure tax compliance, businesses are typically also required to employ advanced tax control frameworks (OECD, 2016b). Tax authorities, on the other hand, provide taxpayers with timely feedback on the interpretation of transactions and associated tax laws. Ideally, any tax issues are thus resolved when they arise, resulting in reduced risk of unexpected tax payments or litigation. Indeed, research has shown that large businesses perceive this improvement of certainty and the resulting reduction in tax risk as the primary advantage compared to conventional, ex-post tax audits (Eberhartinger and Zieser, 2020; e.g. Enachescu *et al.*, 2019; Goslinga, Siglé and Veldhuizen, 2019).

Conversely, the use of statistical or AI-based methods to analyze taxpayer data can be seen as a recent example of purely power-enhancing measures, as tax administrations use taxpayer data to augment tax auditing (OECD, 2016a, 2019). Due to the increasing amount of data available to tax authorities, such methods may significantly increase their capabilities to detect irregularities in accounting data and tax returns. However, questions about the treatment of taxpayer data (i.e., which data is stored, and for how long) are not only relevant with regard to audit efficiency but also concerning data privacy and security (Houser and Sanders, 2017; e.g. Laury and Wallace, 2005).

Combining both the trust- and power-related aspects of these recent developments in tax administration, e-audits (i.e., automatic tax audits based on detailed accounting data) may be regarded as the next advancement in tax collection. Concerning power, e-audits may allow tax authorities to use comprehensive data-driven analyses by increasing the collection of taxpayer data at large scale.

Moreover, by drastically improving audit coverage, authorities have more resources available to focus manual tax auditing on non-compliant taxpayers. On the other hand, e-audits may offer benefits to taxpayers that foster trust, for example, by providing more certainty and transparency. Similar to cooperative compliance, e-audits may thus aim to promote a cooperative, synergistic climate between taxpayers and tax authorities.

While there is ample evidence on the positive effects of enforcement and trust-related measures on tax compliance, very little is known about their potential effects in an e-governance context and how e-audits and their potential features are perceived by taxpayers and tax auditors. As outlined in the next section, this study thus focuses on different variants of an e-audit program that incorporates features of cooperative compliance and data-driven auditing to test the potential effects of e-audits on perceived trust and power, and on the acceptance of e-audits by taxpayers and tax auditors.

2.2 Features of e-audits and hypotheses development

To foster acceptance among taxpayers, the potential benefits of e-audits compared to conventional tax audits need to be communicated and understood. Similarly, for e-audits to be successful, tax auditors have to support their implementation, as they will be involved in developing and utilizing e-audits on the side of tax authorities. Despite a considerable number of studies on the adoption of e-government services (see Hofmann, Räckers and Becker, 2012; Rana, Dwivedi and Williams, 2015), no studies have yet examined the effects of service- and enforcement-related features on e-governance acceptance in a tax context. Given the specific context of tax administration, which includes strict confidentiality requirements in most countries, immediate cash consequences of tax payments, and drastic fines for non-compliance, we consider the tax environment a unique case of e-governance that requires further analysis.

The present study examines the effects of four distinct features, which we expect to be particularly relevant from the perspectives of data-driven auditing and cooperative compliance. The features were operationalized after in-depth interviews with representatives of the Austrian Ministry of Finance[3] and are as follows:

a) *Data privacy*: Data uploaded by taxpayers for the purpose of an e-audit is deleted after the e-audit is concluded;
b) *Audit certainty*: Follow-up tax audits are prohibited unless there is serious evidence of abuse;
c) *Transparency*: Users receive a detailed explanation of how the e-audit result was obtained;
d) *Independence*: Taxpayers can opt to use e-audits without employing tax intermediaries.

As outlined in greater detail below, we expect that all four features increase the perceived service quality provided by tax authorities and reduce the perceived probability with which tax authorities can detect tax evasion. Based on the predictions of the SSF, we thus expect that among both taxpayers and tax auditors all features will increase the perceived trustworthiness of tax authorities and decrease the

[3] The Austrian Ministry of Finance envisages the implementation of voluntary e-audits. At the time of our analysis, e-audits were not yet implemented. Austria is among the first countries to develop e-audits.

perceived power of tax authorities. Furthermore, we expect both better services and lower enforcement to be reflected in increased acceptance by taxpayers. However, despite partial evidence that tax auditors are aware of trust- as well as power-related motivations of taxpayers (Gangl *et al.*, 2019), it is unclear how tax auditors judge the relative importance of services and enforcement in the context of their own profession. For tax auditors, we thus do not make predictions about the effects of the four features on their acceptance of e-audit implementation but explore the respective relationships.

Feature a), data privacy, is related to the increasing utilization of data-driven auditing by tax authorities and to the transparency requirement of cooperative compliance. Uploading accounting data renders business processes and transactions more transparent and may thus make tax auditing more efficient and accurate. In the case of e-audits, data made available by taxpayers may further enable tax authorities to match transactions of different taxpayers and conduct more comprehensive statistical analyses at a later point in time. However, such a use of data may be limited by data privacy measures (i.e., if taxpayer data is deleted directly after an e-audit). On the one hand – in line with the economic models of tax compliance – taxpayers might perceive data privacy as an opportunity to evade taxes. On the other hand, data privacy may also be perceived as a sign of service orientation and trust by tax authorities. In contrast, storing data indefinitely may be regarded as a disproportionate invasion of privacy, which could decrease trust. Therefore, we expect data privacy to negatively affect power and to positively affect trust among both taxpayers and tax auditors. Among taxpayers, we also expect data privacy to lead to higher acceptance of e-audits.

Feature b), audit certainty, is closely related to cooperative compliance programs. Assuming that taxpayers perceive conventional tax audits and the risk of unexpected tax payments as costly, we expect that granting audit certainty (i.e., the guarantee that no further audits of the same period will take place) will be perceived as a considerable improvement of service quality, which leads to increased trust. At the same time, audit certainty may be regarded as a significant reduction in power to detect tax evasion, diminishing the threat of random or unexpected audits. Indeed, research suggests that taxpayers react to audit certainty with decreased tax compliance (Muehlbacher *et al.*, 2012). As with data privacy, we expect audit certainty to positively influence perceived trustworthiness and to negatively influence power among both taxpayers and tax auditors. Among taxpayers, we expect audit certainty to positively affect the acceptance of e-audits.

Feature c), transparency, can be understood as increased communication with taxpayers to reduce uncertainty about the interpretation of audit results. As in cooperative compliance programs, improved communication may facilitate data preparation and efforts to comply with tax laws, enhancing service quality. However, transparency about audit routines might also facilitate manipulating uploaded data in a way that minimizes taxpayers' tax burden. Again, we expect transparency to decrease the perceived power of financial authorities and to increase their perceived trustworthiness among both taxpayers and tax auditors. Among taxpayers, we expect transparency to increase acceptance of e-audits.

Feature d), independence, can also be related to cooperative compliance. Just as tax control frameworks are essential for cooperative compliance programs, in order to minimize the risk that taxpayers upload incorrect data, taxpayers using e-audits may be required to employ tax intermediaries for e-audits. This, however, may be perceived as unnecessary compliance costs by taxpayers, decreasing their acceptance of e-audits. Because the feature independence was phrased to be completely voluntary, we expect independence to be perceived as a potential benefit that allows taxpayers to save costs if they wish to do so. Similar to the three other features, independence may be interpreted as a service to taxpayers and a sign of trust. On the other hand, tax intermediaries act as supervisory agents who promote their clients' tax compliance. As with the three other features, we expect independence to positively influence trust and negatively affect perceived power among both taxpayers and tax auditors. Among taxpayers, we again expect that independence leads to higher acceptance of e-audits.

In summary, we expect both taxpayers and tax auditors to react to all four features with increased perceived trustworthiness of tax authorities and decreased perceived power of tax authorities to detect tax evasion. Moreover, we also expect all four features to increase acceptance (i.e., expected utilization) of e-audits among taxpayers. We thus hypothesize:

H1a-d: The features (data privacy, audit certainty, transparency, and independence) have a positive effect on the perceived trustworthiness of tax authorities both in the groups of taxpayers and tax auditors.

H2a-d: The features (data privacy, audit certainty, transparency, and independence) have a negative effect on the perceived power of tax authorities both in the groups of taxpayers and tax auditors.

H3a-d: The features (data privacy, audit certainty, transparency, and independence) have a positive effect on taxpayers' acceptance of e-audits.

3. Method

3.1 Procedure and participants

We used an experimental online questionnaire among Austrian taxpayers and tax auditors. The operationalization of e-audits and their potential features was developed based on in-depth interviews with representatives of the Austrian Ministry of Finance. In a pre-test phase, ten tax experts, three business owners as well as representatives of the Austrian Economic Chamber, of the Austrian Ministry of Finance, and of the Austrian Chamber of Tax Advisors provided feedback on the comprehensibility of the presented e-audit program, its features, and all questionnaire items. Feedback from this pilot phase concerned minor details in the wording of the scenario and items and was incorporated in the final version of the questionnaire. We empirically analyze the responses to test our hypotheses, complementing hypothesis tests by an explorative analysis to shed further light on tax auditor´s perceptions.

Taxpayers were invited by the Federation of Austrian Industries and by the Austrian Chamber of Commerce. The Austrian Ministry of Finance invited tax auditors. Among Austrian taxpayers, we acquired responses from self-employed and incorporated taxpayers of various sizes. Within the Austrian

tax authorities, a large number of tax auditors responsible for business taxation with direct contact to taxpayers (both off-site and on-site auditors) participated in the survey. Data collection took place from October 2019 to January 2020.

Overall, we collected responses from 861 participants. 530 of ca. 1,800 invited tax auditors participated in the survey (29%). Taxpayers were invited by the Austrian Chamber of Commerce via their decentralized newsletters,[4] and by the Austrian Federation of Industries via e-mail,[5] resulting in 331 taxpayer responses. Table 1 displays sociodemographic data by group as well as additional statistics for the group of taxpayers. Our respondents are predominantly male, especially in the group of taxpayers, and above the age of 50; taxpayer respondents are largely business owners of micro-, small- and medium-sized enterprises. In this regard, participants appear representative of the target population of automated tax audits, which generally are micro-, small- and medium-sized businesses.

	Taxpayers (N = 331)		Tax auditors (N = 530)		Total sample (N = 861)	
	N	%	N	%	N	%
Gender						
Female	76	23.0	223	42.1	299	34.7
Male	255	77.0	307	57.9	562	65.3
Age						
< 20	1	0.3	2	0.4	3	0.3
20-29	13	3.9	112	21.1	125	14.5
30-39	45	13.6	62	11.7	107	12.4
40-49	89	26.9	108	20.4	197	22.9
50-59	115	34.7	212	40.0	327	38.0
60-69	56	16.9	34	6.4	90	10.5
> 69	12	3.6	0	0.0	12	1.4
Position in business						
Owner	295	89.1				
Employee	36	10.9				
Business sales in Euro						
< 35.000	68	20.5				
35,000 – 100,000	72	21.8				
100,000 – 220,000	65	19.6				
222,000 – 700,000	46	13.9				
700,000 – 10 Mil.	53	16.0				
10 Mil. – 40 Mil.	12	3.6				
40 Mil. – 200 Mil.	6	1.8				
200 Mil. – 1 Billion	4	1.2				
> 1 Billion	5	1.5				

Table 1: Sociodemographic data by group and business characteristics.

3.2 Material

The experimental questionnaire was implemented online in German. Using a responsive layout for the questionnaire's design, we ensured that participants could comfortably complete the experimental questionnaire on desktop computers and mobile devices with smaller screens. The

[4] The exact number of invitees, and the response rate, are therefore not available. In 2019, the Austrian Chamber of Commerce had 537.636 members, including double counts (membership per state, membership in several states is possible).

[5] A link to the survey was sent via e-mail to ca. 150 financial experts of ca. 135 companies.

questionnaire had four parts: i) demographics, ii) baseline measures, iii) description of e-audit programs (including experimental treatments) and repeated measures, and iv) open questions. All items were phrased identically for all respondents, except for the automatically branching sociodemographic section and the item measuring the acceptance of e-audits (see below).

Following the sociodemographic section, baseline items measured participants' perception of trust in and power of tax authorities as well as general perceptions about the tax system and respondents' motives to pay taxes. Items for the constructs of trust and power were adapted from Erard *et al.* (2019) and from Kogler *et al*. (2015). All items were answered on a five-point Likert-type scale.

Participants were then presented with the first of up to five rounds containing a description of a hypothetical e-audit program, namely that the process is voluntary, that accounting data has to be uploaded to the servers of the tax administration, and that the data is assessed automatically. Furthermore, each round differed in four features. Randomized across participants and rounds, each of the four features was either presented as available or as unavailable. The order in which features were presented was also randomized within each round to prevent potential order effects. This means that in each of the up to five rounds in which e-audits were assessed by participants, four features were displayed in random order, each being displayed at random as either available or as unavailable. The features were presented as available [unavailable] as follows:

a) **Data privacy**: After finishing the audit process, all data supplied to the tax authorities will be deleted permanently. [Accounting data provided by the taxpayer will be stored by the tax authorities. Data will not be deleted even if the audit process is aborted.]
b) **Audit certainty**: After a tax return has been successfully generated based on the uploaded accounting data, future tax audits for the respective year of assessment are prohibited. This only applies if potential irregularities in the accounting data could be clarified online. [Even if a tax return has been successfully generated in the digital audit process, a conventional tax audit can still take place at a later time.]
c) **Transparency**: After finishing the audit process, taxpayers receive information about how the audit result was generated. [Taxpayers are only informed about the result of the digital audit. No additional information about the audit process is provided.]
d) **Independence**: Taxpayers may use the process independently and without the assistance of tax professionals. [To use the digital audit process, taxpayers need to be represented by a tax intermediary, because only tax intermediaries can upload accounting data.]

Directly after reading the description of the process, which included the randomly displayed set of features, participants responded to items adapted from the Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris and Davis, 2003). As a measure of their overall acceptance of e-audits, participants first indicated their *behavioral intention*, i.e., their likelihood to utilize (for business owners), to utilize or recommend utilization (for business employees), or to endorse (for tax auditors) the process as described. The indication was given in steps of five percentage points via a slider from 0

to 100%. Subsequently, participants indicated whether they believed the automated tax audit process was easy to use (*effort expectancy*), provided benefits for themselves (*performance expectancy*), and whether they believed to receive sufficient support in using the process or not. In addition, participants were asked to indicate whether they expected the results of the presented e-audit process to be correct.

Following this, participants indicated the perceived change in the trustworthiness and power of tax authorities due to the e-audits in items adapted from the baseline measures of trust and power described above. Further, participants indicated the perceived change of the complexity, uncertainty, effort, and compliance costs. Perceived change was indicated on a 5-point scale ranging from -2 (negative change) to +2 (positive change).

After finishing the questions to the first scenario, participants were invited to respond to a second variation of the e-audit program, i.e., a second round that included the identical items but a newly randomized combination of the four features. Following this second round, participants could complete up to three more rounds, i.e., a maximum of five rounds in total, or choose to quit the survey after each round. The majority of participants completed two rounds (see Table 2 for statistics on the number of completed rounds). After finishing the main part of the survey, participants could answer open questions, namely what they liked best about the described process, what they found most problematic, and how the process could improve.

	Number of rounds completed					
Group	1	2	3	4	5	Mean
Taxpayers	70 (331)	180 (261)	39 (81)	15 (42)	27 (27)	2.24
Tax auditors	89 (530)	267 (441)	89 (174)	30 (85)	55 (55)	2.42

Table 2: Number of participants by number of rounds completed. This table displays the number of participants by the number of completed rounds, the cumulative number of participants who completed at least the respective number of rounds (in parentheses), and the mean number of completed rounds among taxpayers and tax auditors.

While the questionnaire covered a wider range of potential outcomes as well as open questions, we focus our main analysis on the items measuring behavioral intention and perceived change of trustworthiness and power of tax authorities, as these measures are the most suitable indicators for the overall acceptance and for the potential effects on tax compliance, respectively. Other items and scales, however, are used for additional analyses and robustness checks.

Table 3 displays means and standard deviations of all measures used in the main analysis. Means of responses in behavioral intention show that, across all treatments and rounds, taxpayers indicate a 36% probability of using e-audits, while tax auditors indicate a 46% probability of endorsing the implementation of e-audits. In other words, the likelihood to use or endorse e-audits is, overall, below 50%. Average responses in the scales change of trust and change of power show a perceived increase in the trustworthiness of tax authorities and a perceived decrease in the power of the tax authorities in the group of tax auditors. Taxpayers perceive the opposite: a comparably strong increase in power and a

slight decrease in trust through e-audits. Cronbach's Alphas indicate acceptable to good internal consistencies of the four three-item scales used in the analysis.

	Taxpayers			Tax auditors		
Scales/Items	Mean	*SD*	Cronbach's Alpha	Mean	*SD*	Cronbach's Alpha
			Single measures			
Trust (baseline)	3.14	0.96	.85	4.02	0.69	.68
Power (baseline)	3.44	0.81	.69	2.63	0.74	.67
			Repeated measures			
Behavioral intention	35.96	33.25	-	45.61	30.66	-
Change of trust	-0.09	0.79	.85	0.16	0.65	.74
Change of power	0.32	0.70	.70	-0.16	0.84	.80
Participants		331			530	
Observations		742			1285	

Table 3: Descriptive statistics of variables used in the analysis. This table displays means, standard deviations, and internal consistencies (Cronbach's Alpha) for scales and items used in the analysis on the participant level for single measures and the observation level for repeated measures. Means of repeated measures are thus grand means across observations, Cronbach's Alphas for the repeated measures represent the overall internal consistencies across all rounds.

4. Analysis and results

While we aimed at measuring the constructs of interest as similarly as possible in the groups of taxpayers and tax auditors, we assume that their responses reflect fundamentally different perspectives and cannot be compared statistically. Therefore, we do not conduct formal tests of differences between the two groups but provide a qualitative comparison of responses and reactions to treatments.

To test the effects of the four features on the acceptance of e-audits (operationalized as the behavioral intention to use or endorse e-audits) and on the perceived change of power and trustworthiness of the tax authorities, we thus estimate separate multilevel models using maximum likelihood estimation with random intercepts for each of the dependent variables in both the groups of taxpayers and tax auditors. Besides the random intercept, we only estimate fixed (i.e., participant-invariant) effects for all covariates included in the model.

Multilevel models are better suited than other alternatives (such as fixed-effects regressions, pooled regressions, or repeated-measures ANOVA) because participants could respond to up to five different versions of the e-audit process, with the four experimental treatments data privacy, audit certainty, transparency, and independence varying across rounds. Observations are thus clustered within participants; responses by the same participants are not independent and may be correlated. Using multilevel models with random intercepts, we are able to disaggregate the variance in responses as well as in the experimental treatments into two levels, namely Level 1 (observation-level or within-subjects variance), and Level 2 (participant-level or between-subjects variance).

Variance on Level 1 reflects changes in participants' responses across rounds, which may be caused by changes in treatments independently from the average level of responses or treatments.

Level 2 variance, on the other hand, reflects variation in the average response by each participant, which may be caused not only by participant characteristics but also by the average manifestation of the randomized treatments. By allowing covariates on both levels, multilevel models allow the simultaneous estimation of "average" effects on the subject level (Level 2), and of the "effects of change" on the observation level (Level 1).

Appendix 2 outlines a general multilevel model with a random intercept (Equations 1-3), variance components of our dependent variables (Equation 4 and Table 10), transformations of independent variables (Equations 5 and 6), and the full multilevel models used in our main analyses (Equations 7 and 8).

To further confirm results from our main analyses, we conduct complementary analyses using additional dependent variables and robustness checks, including split-sample analyses and fixed-effects regressions. The following sections present variables used in the analyses, descriptive results, results of the multilevel models for both the groups of taxpayers and tax auditors, as well as additional analyses and robustness checks.

4.1 Dependent variables

We measure i) *BehavioralIntention*, either as the indicated probability (in percent) to use, use or recommend utilization, or endorsing e-audit implementation among the groups of business owners, business employees, and tax auditors, respectively. In our main analyses, we do not distinguish between business owners and business employees, but employee status is included as a control variable as outlined below. We further measure ii) the 3-item scale *TrustChange,* which assesses the change of trust in the tax authorities due to the presented e-audit, and iii) the 3-item scale *PowerChange*, indicating the change of perceived power of the tax authorities due to the e-audit. Scales of the latter two variables were constructed as the mean of these 5-point items, with values from -2 to +2 indicating a negative or positive perceived change. All dependent variables are presented in Table 9 in Appendix 1.

Correlations between the dependent variables give a first indication of participants' reactions to the different e-audit processes (see Table 4). Only in the group of tax auditors, correlations suggest that *BehavioralIntention* is strongly associated with *PowerChange.* In the group of taxpayers, on the other hand, the *BehavioralIntention* is more strongly associated with *TrustChange.*

	BehavioralIntention	*TrustChange*	*PowerChange*
BehavioralIntention	-	.29	.53
TrustChange	.45	-	.28
PowerChange	.09	.17	-

Table 4: Correlations between dependent variables. This table displays intercorrelations between the dependent variables for all observations within the subsample of taxpayers and the subsample of tax auditors. Cells above the diagonal show correlations for tax auditors, below the diagonal for taxpayers. All correlations are significant at $p < .05$.

4.2 Independent variables

Our independent variables are the four experimental features *DataPrivacy, AuditCertainty, Transparency,* and *Independence,* as well as a small number of additional explanatory variables. All variables used in the models, including their measurements and transformations, are presented in Table *8* in Appendix 1.

Each experimental treatment was dummy coded: When a feature was presented as available, it was assigned the value 1 (0 if unavailable). To disaggregate observation- and subject-level variance of the treatments, each of these indicator variables is included twice in the model, first on Level 1 as the deviation from the participant mean to only capture the change in treatments (participant-centered, denoted by x^{PC}; see Equation 6 in Appendix 2), and second on Level 2 as the participant average (denoted by $\bar{x}$) to only capture the average treatment manifestation. All Level 2 variables are entered as the deviation from the grand mean (grand mean centered; denoted by x^{GMC}; see Equation 7 in Appendix 2), so that the model intercept reflects the overall mean of observations.

As an additional observation-level (Level 1) covariate, we also include the participant-centered variable $Round^{PC}$ into the model. As other explanatory covariates on Level 2, we include the baseline measures of Trust ($TrustBaseline^{GMC}$) and perceived power of the tax authorities ($PowerBaseline^{GMC}$), each measured once at the beginning of the experiment on 3-item scales from 1 (*low*) to 5 (*high*). We also include the completed number of rounds for each participant ($Rounds^{GMC}$). Moreover, only in the group of taxpayers, we include the 8-category item measuring business sales ($Sales^{GMC}$) and the participants' position in the business ($Employee^{GMC}$), coded 1 for employees and 0 for business owners. Continuous sociodemographic variables were measured in intervals to protect participants' privacy (see Table 1).

4.3 Descriptive results

Figure 1 gives a first intuition of our results. For taxpayers, the availability of each feature increases *BehavioralIntention* (Panel A), as indicated by mean differences larger than zero in Panel C, in particular for data privacy and audit certainty. For tax auditors, the opposite is true. Each feature's availability reduces *BehavioralIntention* (Panel B; negative mean differences in Panel D), particularly audit certainty.

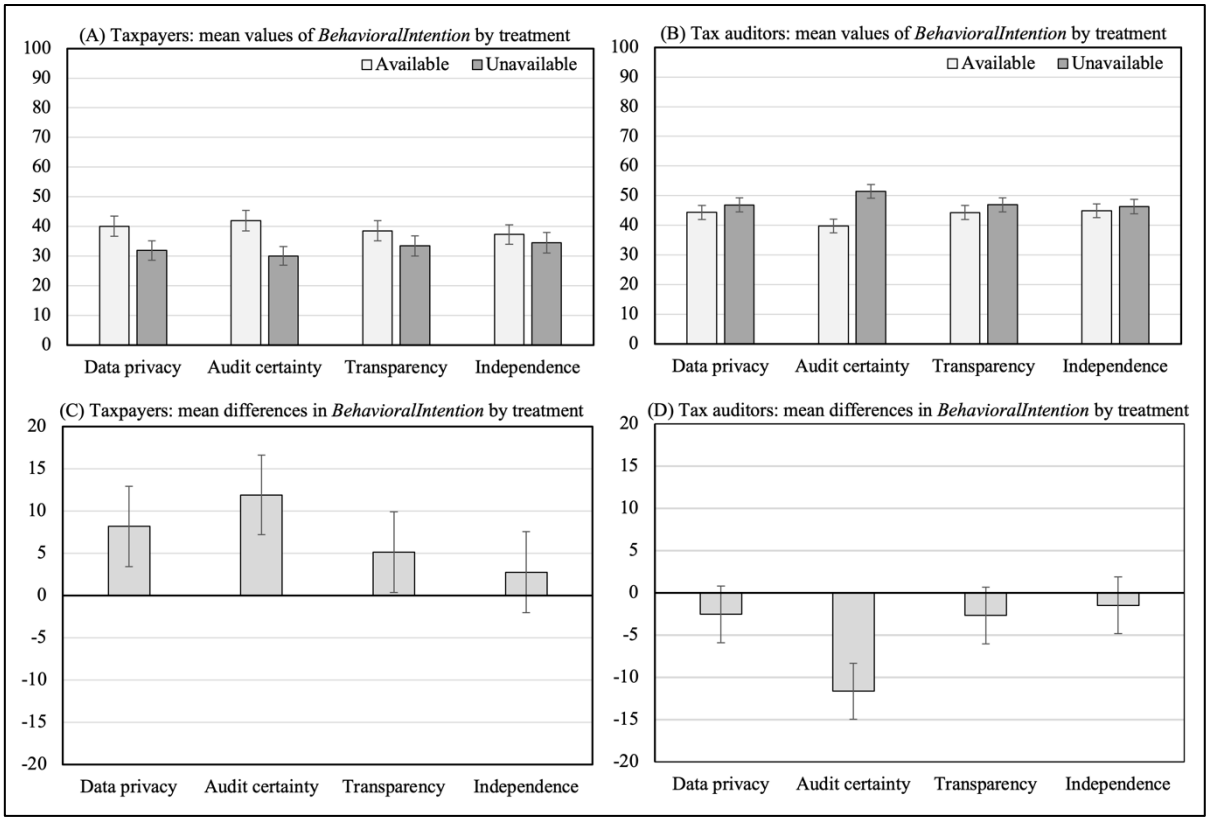

Figure 1: Mean values and mean differences in the dependent variable *BehavioralIntention* by treatments. Panels A and B display mean values of *BehavioralIntention* by treatment manifestation, showing the mean response in rounds in which the respective feature was presented as available or unavailable for the groups of taxpayers (Panel A) and tax auditors (Panel B). Panels C and D show the mean differences from Panels A and B, i.e., the mean differences between rounds with the respective feature presented as available or unavailable for the groups of taxpayers (Panel C) and tax auditors (Panel D). Error bars indicate 95% confidence intervals.

Table 5 shows mean responses and standard deviations of the three dependent variables from the subsamples of rounds in which the four features (data privacy, audit certainty, transparency, and independence) were either all displayed as available at the same time or as unavailable. While these rounds cover only a small part of the whole sample, they provide insights into the potential magnitude of differences caused by the four features. Indeed, most dependent variables exhibit large differences in mean responses depending on the presented features of e-audits. Among taxpayers, the average *BehavioralIntention* is much higher in rounds where all features were presented as available (46%) than in rounds with none of the features available (19%). Taxpayers also indicated a reduction in tax authorities' trustworthiness (*TrustChange*) if no feature was available. With regard to perceived changes in power (*PowerChange*), there is only a minor difference, with slightly higher perceived increases in power when all features were available. Conversely, tax auditors reported much higher *BehavioralIntention* in rounds where no feature was available (56%) than in rounds where all features were available (33%). While there is only a negligible difference in *TrustChange,* tax auditors indicate a distinct reduction of power (*PowerChange*) in rounds with all features presented as available.

		Dependent variables					
		BehavioralIntention		*TrustChange*		*PowerChange*	
Features	Observations	Mean	SD	Mean	SD	Mean	SD
			Taxpayers				
All features available	48	46.25	32.62	-0.03	0.78	0.44	0.64
No feature available	43	19.07	24.84	-0.47	0.94	0.34	0.94
Data privacy							
Available	374	40.08	33.82	-0.01	0.77	0.30	0.68
Unavailable	368	31.91	32.22	-0.17	0.80	0.34	0.71
Audit certainty							
Available	370	42.92	34.28	0.04	0.79	0.34	0.67
Unavailable	372	30.04	31.13	-0.22	0.78	0.30	0.72
Transparency							
Available	371	38.52	33.45	-0.08	0.77	0.34	0.65
Unavailable	371	33.41	32.90	-0.10	0.81	0.30	0.74
Independence							
Available	385	37.29	33.02	-0.05	0.76	0.35	0.65
Unavailable	357	34.54	33.48	-0.13	0.82	0.29	0.75
Total	742	35.96	33.25	-0.09	0.79	0.32	0.70
			Tax auditors				
All features available	84	32.74	27.99	0.18	0.71	-0.64	0.87
No feature available	81	55.56	32.06	0.21	0.62	0.04	0.80
Data privacy							
Available	636	44.33	30.42	0.18	0.65	-0.24	0.85
Unavailable	649	46.86	30.86	0.14	0.65	-0.08	0.82
Audit certainty							
Available	647	39.83	30.08	0.18	0.67	-0.32	0.86
Unavailable	638	51.47	30.14	0.13	0.64	0.01	0.78
Transparency							
Available	642	44.28	30.65	0.17	0.68	-0.23	0.85
Unavailable	643	46.94	30.63	0.14	0.63	-0.09	0.82
Independence							
Available	643	44.88	30.26	0.16	0.68	-0.18	0.84
Unavailable	642	46.35	31.05	0.16	0.63	-0.14	0.83
Total	1285	45.61	30.66	0.16	0.65	-0.16	0.84

Table 5: Means and standard deviations of dependent variables by experimental treatments. This table displays mean responses and standard deviations of the dependent variables *BehavioralIntention, TrustChange,* and *PowerChange* by treatments and group. Statistics are calculated across observations.

Table 5 also shows means and standard deviations for all four features separately, contrasting rounds in which either of the four features was available or unavailable (i.e., independently from the status of the other three features).

The direction of treatment effects appears to be consistent across all four features: if any of the features was presented as available, taxpayers tended to react with higher values in *BehavioralIntention* and *TrustChange*, and tax auditors with lower values in *BehavioralIntention* and *PowerChange*. In line with Figure 1, in the group of taxpayers, a major portion of the differences appears to be caused by only two features, namely data privacy, and audit certainty. Among tax auditors, audit certainty appears to be the main determinant of *BehavioralIntention*, while the three features data privacy, audit certainty, and transparency appear responsible for the reduction in perceived power.

These descriptive results provide a first indication of the reactions to e-audits and the effects of e-auditing features. However, they do distinguish between the ad-hoc assessment of features (subject-level effects) and reactions to changes in treatments across rounds (observation-level effects). We thus use multilevel models to disaggregate treatment effects into the subject and observation level. The following section details the results from these models.

4.4 Results from multilevel models

Table 6 and Table 7 show results of the multilevel models with *BehavioralIntention*, *TrustChange*, and *PowerChange* as dependent variables for the groups of taxpayers and tax auditors, respectively. Mean responses in the dependent variables across all treatments and rounds are reflected in the model intercepts. Effects of our randomized treatments (i.e., the effect of the availability of each feature) are reflected in the coefficients of the features.

Treatment effects are disaggregated into two levels: once on Level 1 as the effects of a *change* in the availability of each feature (e.g., the effect of $DataPrivacy^{PC}$), once on Level 2 as the response to the *average* availability of each treatment per participant (e.g., the effect of $\overline{DataPrivacy}^{GMC}$). Other effects of participant-level variables also enter the models on Level 2 (e.g., $TrustBaseline^{GMC}$).

Results from taxpayers

In the group of taxpayers (see Table 6), the intercept of *BehavioralIntention* indicates an average probability of utilization of e-audits of 36%. As reflected by the intercepts of *TrustChange* and *PowerChange*, taxpayers perceive e-audits to significantly increase tax authorities' power, and to reduce their trustworthiness.

Group: Taxpayers	Dependent variables					
	Behavioral Intention		*TrustChange*		*PowerChange*	
Fixed effects	*B*	*SE*	*B*	*SE*	*B*	*SE*
	Level 1 (within participants)					
Intercept	35.96***	1.73	-0.09**	0.04	0.32***	0.04
$DataPrivacy^{PC}$	11.52***	1.77	0.20***	0.05	-0.03	0.04
$AuditCertainty^{PC}$	13.57***	1.75	0.18***	0.05	-0.01	0.04
$Transparency^{PC}$	6.01***	1.81	0.05	0.05	0.06	0.04
$Independence^{PC}$	4.34**	1.79	0.02	0.05	0.02	0.04
$Round^{PC}$	-1.31	0.83	-0.01	0.02	-0.01	0.02
	Level 2 (between participants)					
$\overline{DataPrivacy}^{GMC}$	1.16	4.68	0.13	0.10	-0.05	0.10
$\overline{AuditCertainty}^{GMC}$	9.38*	4.84	0.25**	0.11	0.04	0.10
$\overline{Transparency}^{GMC}$	3.83	4.53	0.02	0.10	-0.01	0.09
$\overline{Independence}^{GMC}$	-3.65	4.66	0.02	0.10	0.11	0.10
$Rounds^{GMC}$	-2.42	1.48	-0.03	0.03	-0.05	0.03
$TrustBaseline^{GMC}$	5.32***	1.73	0.26***	0.04	0.09**	0.04
$PowerBaseline^{GMC}$	0.80	2.08	-0.01	0.05	0.07*	0.04
$Sales^{GMC}$	1.29	0.91	0.01	0.02	0.01	0.02
$Employee^{GMC}$	1.49	3.57	0.06	0.08	-0.04	0.07
Random effects	σ^2		σ^2		σ^2	
Between variance (σ_u^2)	679.24		0.31		0.28	
Residual variance (σ_e^2)	347.08		0.23		0.18	
Observations	742		742		742	
Participants	331		331		331	

Table 6: Multilevel regressions in the group of taxpayers on the dependent variables *BehavioralIntention*, *TrustChange*, and *PowerChange*. The models include a random intercept which controls for between-subject variance, effectively disaggregating the variance of the dependent variable into Level 1 variance (within participants, capturing the variation across rounds), and Level 2 variance (capturing the variation across participants). Variance of the four randomized treatments *DataPrivacy, AuditCertainty, Transparency*, and *Independence* (all being assigned the value 1 if the feature was presented as available, or 0 if unavailable) was disaggregated by participant-mean centering (denoted by x^{PC}) on Level 1, and by using the participant means on Level 2 (denoted by $\bar{x}$). To facilitate interpretation of the intercept, all variables on Level 2 were entered as grand-mean-centered (denoted by x^{GMC}). The models were estimated using maximum likelihood estimation. *… p < .10, **… p < .05, ***… p < .01.

We find that the experimental treatments *DataPrivacy* and *AuditCertainty* show the strongest within-subject effects (Level 1), both significantly increasing *BehavioralIntention* as well as *TrustChange.* The other two experimental factors *Transparency* and *Independence* only show significant and positive effects on *BehavioralIntention.* On the between-subject level (Level 2), however, *AuditCertainty* is the only treatment with a significant effect, again increasing *BehavioralIntention* and *TrustChange*. Regarding power, we find that taxpayers do not indicate a significant increase or decrease in the perceived power of the tax authorities that is due to any of the four treatments.

These results suggest that taxpayers react less strongly in their global assessment of the presented e-audit processes than when they reacted to changes from one version to another, with only the treatment

audit certainty showing a consistent effect on both levels. Nevertheless, when confronted with both the available and unavailable versions of the four features, participants significantly prefer all four features to be available, with data privacy and audit certainty also significantly increasing perceived trust in the authorities.

Regarding other explanatory variables, we find significant effects of *TrustBaseline,* which is positively associated with all three dependent variables, in particular *BehavioralIntention,* and *TrustChange*. In other words, taxpayers who already display high trust in tax authorities are more likely to use e-audits and react to e-audits with higher increases in trust.

In the group of taxpayers, we thus find evidence for hypotheses H1a and H1b, as the features data privacy and audit certainty significantly increased taxpayers' perceived trustworthiness of the authorities. Our results also support hypotheses H3a-d, as taxpayers appear to react with higher acceptance of e-audits when each of the four features was presented as available. We do not find any evidence for H2a-d, as taxpayers do not indicate any significant changes in tax authorities' power due to the availability of the four features.

Results from tax auditors

In the group of tax auditors, results appear markedly different than in the group of taxpayers (see Table 7). In the variable *BehavioralIntention,* tax auditors indicate an average probability of endorsing e-audits of 46%. In contrast to taxpayers, tax auditors perceive e-audits to significantly increase trust and reduce power. *BehavioralIntention* and *TrustChange* are also significantly reduced over rounds, as indicated by the negative coefficient of *Round* (on Level 1) in Table 7. Significant coefficients of *Rounds* (on Level 2) also indicate that tax auditors with more negative reactions in all four dependent variables tended to complete more rounds of the experiment.

On the within subject-level (Level 1), *AuditCertainty* significantly decreases *BehavioralIntention* as well as *PowerChange. Transparency*, on the other hand, shows no effect on *BehavioralIntention*, but positive effects on *TrustChange*. On the between-subject level (Level 2), all treatments except *Independence* have a significant and negative effect on *PowerChange*. Moreover, *AuditCertainty* and *Transparency* show negative effects on *BehavioralIntention*. As opposed to taxpayers, results suggest that tax auditors react negatively to the same feature that made e-auditing most attractive to taxpayers, namely audit certainty: Tax auditors express a smaller likelihood to endorse e-audits and a significant loss in power to detect tax evasion should audit certainty be available.

With regard to the baseline measures of *TrustBaseline* and *PowerBaseline,* results also stand in contrast to the results in the group of taxpayers. We find that the perceived power of the authorities is associated with a significant increase in all three dependent variables, while *TrustBaseline* does not show any significant effects. This means that tax auditors expect a stronger gain (or smaller reduction) in power and trust and are more likely to endorse e-audits if they believe that tax authorities already have the power to efficiently detect tax evasion.

In the group of tax auditors, results support H1c because tax auditors perceive a significant increase in tax authorities' trustworthiness when e-audits are more transparent. We find clear support for H2b, as tax auditors indicate a decrease in tax authorities' power when e-audits provide audit certainty. We also find limited evidence for H2a and H2c, as there are negative effects of data privacy and transparency on the perceived change of power on the between-subject level, but not on the within-subject level. This means that tax auditors did not react with significant changes in their assessments when the availability of a feature changed across rounds.

Group: Tax auditors	Dependent variables					
	Behavioral Intention		*TrustChange*		*PowerChange*	
Fixed effects	*B*	*SE*	*B*	*SE*	*B*	*SE*
	Level 1 (within participants)					
Intercept	45.61***	1.16	0.16***	0.03	-0.16***	0.03
$DataPrivacy^{PC}$	-0.09	1.39	0.05*	0.03	-0.06	0.04
$AuditCertainty^{PC}$	-15.52***	1.37	0.05	0.03	-0.43***	0.04
$Transparency^{PC}$	-0.04	1.39	0.12***	0.03	-0.04	0.04
$Independence^{PC}$	-1.48	1.39	-0.02	0.03	0.03	0.04
$Round^{PC}$	-2.37***	0.62	-0.06***	0.01	0.02	0.02
	Level 2 (between participants)					
$\overline{DataPrivacy}^{GMC}$	-4.32	3.29	0.02	0.07	-0.21**	0.09
$\overline{AuditCertainty}^{GMC}$	-5.95*	3.33	0.06	0.07	-0.19**	0.09
$\overline{Transparency}^{GMC}$	-5.75*	3.28	-0.11	0.07	-0.26***	0.09
$\overline{Independence}^{GMC}$	-1.12	3.24	0.07	0.07	-0.10	0.09
$Rounds^{GMC}$	-3.40***	0.94	-0.04*	0.02	-0.04	0.03
$TrustBaseline^{GMC}$	0.01	1.65	0.03	0.04	-0.04	0.04
$PowerBaseline^{GMC}$	7.00***	1.51	0.12***	0.03	0.30***	0.04
Random effects	σ^2		σ^2		σ^2	
Between variance (σ_u^2)	457.36		0.23		0.32	
Residual variance (σ_e^2)	382.83		0.18		0.28	
Observations	1285		1285		1285	
Participants	530		530		530	

Table 7: Multilevel regressions in the group of tax auditors on the dependent variables *BehavioralIntention*, *TrustChange*, and *PowerChange*. The models include a random intercept which controls for between-subject variance, effectively disaggregating the variance of the dependent variable into Level 1 variance (within participants, capturing the variation across rounds), and Level 2 variance (capturing the variation across participants). Variance of the four randomized treatments *DataPrivacy, AuditCertainty, Transparency*, and *Independence* (all being assigned the value 1 if the feature was presented as available, or 0 if unavailable) was disaggregated by participant-mean centering (denoted by x^{PC}) on Level 1, and by using the participant means on Level 2 (denoted by $\bar{x}$). To facilitate interpretation of the intercept, all variables on Level 2 were entered as grand-mean-centered (denoted by x^{GMC}). The models were estimated using maximum likelihood estimation. *… p < .10, **… p < .05, ***… p < .01.

4.5 Additional analyses and robustness checks

Analyses with additional dependent variables

To better explain results from our main analyses with the dependent variables *BehavioralIntention*, *TrustChange*, and *PowerChange*, we compute identical multilevel level models with four other dependent variables (see Table 9 in Appendix 1 for variable descriptions). First, *PerformanceExpectancy* measures whether participants perceived a subjective benefit through the e-audit process on a scale from 1 to 5. Second, *CorrectResults* measures whether participants expected results from the presented e-audit process to be accurate on a scale from 1 to 5. Third, *UncertaintyChange* measures whether participants perceive a positive or negative change in uncertainty in the tax system on a scale from -2 to +2. Fourth, *CostsChange* measures whether participants expected a positive or negative change in compliance costs on a scale from -2 to +2. Results for taxpayers and tax auditors are presented in Table 11 and Table 12 in Appendix 3.

Results from these additional multilevel regressions shed additional light on taxpayers' and tax auditors' reactions to e-audits. We find that taxpayers perceive data privacy and particularly audit certainty to be beneficial for them individually, as captured by the effects on *PerformanceExpectancy*, and that they expect audit certainty to significantly reduce uncertainty and compliance costs. However, across all treatments, taxpayers perceive e-audits to significantly increase compliance costs as indicated by the significant positive intercept of *CostsChange*. With regard to independence from tax intermediaries, taxpayers appear to expect a compliance cost reduction from this feature while at the same time experiencing a slight increase in uncertainty. This suggests that taxpayers indeed value the option to use e-audits without (costly) tax intermediaries, while they still expect increased certainty from their support.

Tax auditors, surprisingly, also perceive audit certainty as well as transparency as a benefit in their professional capacity, as can be seen from the significant positive effects on *PerformanceExpectancy*. However, they expect results from e-audits to be significantly less correct if later ex-post audits are prohibited (audit certainty), and, to a smaller degree, if data must be deleted (data privacy). Regarding *UncertaintyChange*, tax auditors do not indicate any significant changes. Moreover, tax auditors expect e-audits to increase compliance costs overall, also expecting independence from tax intermediaries to reduce costs. Considering these results, tax auditors' negative reactions to the feature concerning *PowerChange* and *BehavioralIntention* appear to stem primarily from concerns about the accuracy of e-audits and not from expected personal disadvantages.

Sample splits

To ensure that results from the experimental treatments found in our main analyses hold across large (sales over Euro 200,000) and small businesses (sales under Euro 200,000), across business owners and business employees, as well as across gender and age, we conduct group comparisons using likelihood-ratio tests. To this end, we specify two-group models in which regression coefficients are either free to vary between the two subsamples (which corresponds to a separate analysis of the two

subsamples) or are constrained to be equal (which corresponds to a joint analysis). We then compute likelihood-ratio tests that compare model fit between the constrained and unconstrained two-group models. As age and gender are not included as predictors on Level 2 in our main analysis, we also constrain intercepts for these two variables to test whether overall means in responses are significantly different. To conduct these group comparisons, we apply the same multilevel models as in our main analyses, but we limit the independent variables to the four experimental features on Level 1 and Level 2 as well as the variables $Round^{PC}$ and $Rounds^{GMC}$.

As outlined in more detail below, results from these group comparisons indicate that there are no significant differences in treatment effects between large and small businesses, between business employees and business owners, lending support to the generalizability of our results across a wide range of businesses. Moreover, we find no differences in results across gender and age, expect for the dependent variable *TrustChange*, where we find differences in regression coefficients between older and younger participants both among taxpayers and tax auditors, and differences in means among tax auditors.

First, we construct subsamples from the variable *Sales* within the sample of taxpayers, which results in 463 participants in the subsample with sales under Euro 220,000 and 279 participants indicating sales over Euro 220,000. Between these two groups, we find no significant reduction in fit due to constraining regression coefficients (all $p \geq .60$) for any of the dependent variables *BehavioralIntention, TrustChange* or *PowerChange*, which indicates that there are no significant differences in regression coefficients between taxpayers with high or low sales.

Second, we construct subsamples from the variable *Employee* within the sample of taxpayers. We find no significant differences in regression coefficients between business employees and business owners in the effects on *BehavioralIntention*, *TrustChange*, and *PowerChange* (all $p \geq .25$) , which indicates that there are no significant differences in treatment effects between employees and business owners.

Third, we compare the results of female and male participants among taxpayers (76 female, 255 male) and tax auditors (223 female, 307 male). Constraining regression coefficients and intercepts to be equal results in no significant difference in fit between female and male participants. This indicates that – both among taxpayers and tax auditors – there are no significant differences in the overall mean responses (as reflected in the intercepts) or in the treatment effects on the dependent variables *BehavioralIntention*, *TrustChange*, and *PowerChange* (all $p \geq .53$).

Fourth, using the categorical variable age, we compare results of taxpayers younger than 50 (148 participants) or 50 years and older (183 participants), and of tax auditors younger than 50 (284 participants) or 50 years and older (246 participants). Constraining regression coefficients and intercepts across age groups does not significantly reduce fit for the dependent variables *BehavioralIntention* or *PowerChange*, indicating no significant differences in regression coefficients or intercepts (all $p \geq .18$). However, for the dependent variable *TrustChange*, we find significant differences in regression

coefficients between younger and older participants, both among taxpayers and tax auditors, and in the mean responses among tax auditors (all $p < .10$).

Among tax auditors, older participants appear to react with higher perceived increases in trust to e-audits overall and with lower perceived increases in trust to changes of transparency and audit certainty (as reflected by within-subject effects on Level 1). However, in their overall reactions (between-subject effects on Level 2) older participants appear to react with stronger increases in trust to the feature audit certainty. Older taxpayers, on the other hand, appear to react with smaller increases in trust to the changes in the features data privacy and audit certainty and with stronger increases to changes in the feature transparency. With regard to Level 2 effects, older taxpayers show stronger increases in trust due to the feature transparency. Overall, these differences suggest interaction effects, i.e., that the effects of the presented features on the perceived trustworthiness of tax authorities depend on age.

Alternative regression models

To test whether the four features (data privacy, audit certainty, transparency, and independence) show interaction effects, i.e., whether the availability (or unavailability) of one feature influences the effect of another feature on our main dependent variables, we run pooled regressions (not tabulated) which include all possible first-, second-, and third-order interaction terms. We find no significant interaction effects with $p < .10$.

To confirm the validity of results from multilevel models in Level 1 and on Level 2, we also conduct analyses using a variety of regression models and subsamples. To confirm observation-level (within-subject) effects, we conduct fixed-effects regressions, which control for variation between subjects and rounds by including an indicator variable for each participant and each round (see Table 13 and Table 14 in Appendix 3). We repeat these analyses with data only from the first two rounds to rule out that results are driven by the subset of participants who completed more than two rounds (see Table 15 and Table 16 in Appendix 3). Overall, coefficients from these fixed-effects regressions show only small differences compared to within-subject coefficients from multilevel models and thus confirm our results from the main analysis.

Moreover, to confirm Level 2 (participant-level or between-subject) coefficients of our four features, we compute conventional multiple regressions, averaging treatment variables and dependent variables of each participant across rounds (see Table 17 and Table 18 in Appendix 3). Here, results closely reflect Level 2 coefficients of the multilevel models. Furthermore, we conduct regressions with data only from the first round of each participant (see Table 19 and Table 20 in Appendix 3) to test whether the initial reactions by participants to the four features confirm between-subject results from multilevel models. Some differences in treatment effects suggest that participants' ad-hoc reactions were sometimes stronger and sometimes weaker than in subsequent rounds. Nevertheless, results still confirm our main analyses, reflecting the importance of the feature audit certainty in particular.

5. Discussion and conclusion

In this study, we use an experimental questionnaire to test the acceptance of e-audits and its effects on the perceived power and trustworthiness of tax authorities among taxpayers and tax auditors. We present a hypothetical but realistic e-audit program, an online-based audit process in which taxpayers can opt to upload detailed accounting data regularly to an online platform of tax authorities and obtain an automatic tax audit and assessment of the tax due. As randomized treatments, we present different variants of this process with randomly generated combinations of four features, namely a) data privacy (taxpayer data is deleted after using the process), b) audit certainty (follow-up audits of a period for which an e-audit has been successfully conducted are prohibited), c) transparency (taxpayers receive information about how the audit results were obtained), and d) independence (taxpayers can use e-audits without tax intermediaries).

We find that taxpayers indicate a 36% behavioral intention of using e-audits across all treatments, while tax auditors indicate 46% behavioral intention of endorsing the implementation of e-audit; overall acceptance thus appears rather low. Furthermore, taxpayers generally appear to perceive e-audits as an enforcement measure, indicating an overall increase in power and a reduction in the trustworthiness of the authorities. In contrast, tax auditors perceive e-audits to cause an overall decrease in power and an increase in trustworthiness. However, these reactions to e-audits strongly depend on the specific features incorporated into e-audits.

The availability of the four features contributes significantly and positively to taxpayers' acceptance of e-audits. In this regard, audit certainty, i.e., the assurance that no later conventional audit may take place, appears to be the most important feature for taxpayers, followed by data privacy, i.e., the assurance that all data will be deleted from the tax administration´s servers. Both audit certainty and data privacy also significantly increase taxpayers' perceived trustworthiness of tax authorities, while none of the features appear to negatively impact the perceived power of tax authorities. Group comparisons indicate that these results hold across large and small businesses, across business owners and business employees, as well as across gender and age. However, we do find some differences between younger and older participants for the perceived change in tax authorities' trustworthiness that indicate interaction effects of our treatments and age.

In light of ample evidence that trust is an important predictor of voluntary tax compliance, our results suggest that voluntary e-audits can indeed foster voluntary tax compliance for both small and large businesses, provided that they are combined with service-oriented features for taxpayers. Indeed, similar to the perceived benefits of cooperative compliance programs by large businesses (see Eberhartinger and Zieser, 2020), taxpayers seem to highly value certainty and a reduced risk of unexpected tax payments or litigation. Furthermore, taxpayers react negatively to a considerable expansion of data retention, responding with higher acceptance and trust to e-audit programs only when taxpayer data is deleted. However, counter to our predictions, taxpayers do not perceive any of the tested features to reduce tax authorities' power. From the perspective of taxpayers, results thus indicate that e-

audit programs should generally include strong service- and trust-enhancing features and should provide tax certainty in particular.

In contrast to taxpayers, tax auditors react particularly negatively to audit certainty. Losing the possibility to conduct conventional ex-post audits leads to a smaller likelihood of endorsing e-audits and a significant reduction in the perceived power of tax authorities. This may indicate that tax auditors are suspicious of taxpayers' integrity and fear that e-audits might be misused for tax evasion purposes. In group comparisons, results from tax auditors hold across age and gender, again with the exception of perceived change in tax authorities' trustworthiness, where we find some differences in result between younger and older participants.

Overall, tax auditors appear to be primarily concerned about a loss of power. As e-audits may represent a considerable change in tax auditors' duties, they may be concerned about their professional future, particularly when follow-up (manual) audits are prohibited. Tests with additional dependent variables indicate that tax auditors are especially concerned about the correctness of the results of e-audits when additional ex-post audits are prohibited. These results suggest that tax auditors have genuine concerns that e-audits may be unintentionally misapplied or even abused by taxpayers.

Taken together, results suggest that taxpayers and tax auditors have opposing concerns when evaluating e-audits: While taxpayers appear particularly interested in features that increase service quality and trust, tax auditors are concerned about a potential loss of power to detect tax evasion, with the loss of ex-post audits being particularly divisive. This interpretation of results is also in line with associations between the baseline measures of perceived trust and power and acceptance of e-audits: Taxpayers with high trust in tax authorities indicate significantly higher acceptance of e-audits, while perceived power is not associated with acceptance. In contrast, tax auditors who perceive tax authorities to be powerful indicate significantly higher acceptance of e-audits.

The two perspectives of taxpayers and tax auditors appear difficult to reconcile. While the slippery slope framework suggests that services and trust play an important role in promoting tax compliance, it also emphasizes that a fair amount of enforcement is necessary to ensure compliance. In our sample, however, taxpayers do not appear to be concerned about power or to consider potential opportunities to misuse e-audits. Indeed, as suggested by the model of responsive regulation (Braithwaite, 2012), the majority of taxpayers can be expected to be inherently honest and not interested in deliberate tax evasion. Taxpayers should thus be supported through information and services. Tax auditors, however, may be focusing on the small minority who might actually misuse e-audits, which may affect their perception of taxpayers in general.

Our results suggest that e-audits should include features derived from cooperative compliance that increase their service quality to promote a successful implementation of e-audits and positive effects on tax compliance. Increased data collection and monitoring through e-audits, in contrast, may be counterproductive and cause reduced trust by taxpayers. From the perspective of tax auditors, who appear concerned about incorrect results and abuse of e-audits by dishonest taxpayers, our results

suggest that certain safeguards should be implemented to alleviate these concerns. For example, similar to cooperative compliance, e-audits could be made available only to those taxpayers who have proven to be compliant in the past. Moreover, it appears necessary to clearly communicate actual risks as well as trust-related benefits of e-audits, both within the tax authorities as well as externally, to bridge the gap between taxpayers' and tax auditors' perceptions.

Our study is subject to several general limitations. First, our sample consists only of Austrian taxpayers and tax auditors, which may limit the generalizability of results in other countries. However, the description of the program and its features could be applied to most other jurisdictions with little alterations, and our results may be of interest to tax administrations in other industrialized countries with high overall tax compliance and high standards of tax confidentiality. As e-audits are a novel concept both for Austrian taxpayers and tax auditors, we also expect that reactions were not driven by preconceived opinions about e-audits. Second, while the description of the presented e-audit program was discussed with the Austrian Ministry of Finance, it was hypothetical and had to be condensed to limit the time needed to complete the survey. As we have focused on a limited number of potential e-audit features, it is likely that other aspects of e-audits not covered in our study have an additional impact on the acceptance and effects of e-audits. Absolute results in particular, such as the average behavioral intention to use e-audits, may therefore vary with other features not tested in this study. Third, while we used an experimental design to allow causal inferences, we were not able to observe actual behavior, nor can we rule out that participants self-selected into the survey based on their pre-existing opinions about taxation. Moreover, results may be skewed towards socially desirable answers and not reflect actual (intended) behavior or attitudes by taxpayers or tax auditors. While we acknowledge these limitations, we are convinced that our results are reliable and relevant, and informative for future research and policy design.

As one of the first studies examining e-audits as a major future development in tax collection, our study contributes to the literature in two ways: First, it gives important insights into novel approaches to tax collection, providing further evidence on the importance of the delicate balance between service- and enforcement-based methods to improve tax compliance. Second, our study provides a direct comparison of taxpayers' and tax auditors' opinions, showing that the two groups react in opposite ways to some aspects of the same policies. In light of the increasing importance of data-driven e-governance, our results are of interest to tax authorities, allowing better informed digitalization efforts that improve efficiency as well as trust.

6. Literature

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Appendix 1: Variable definitions

Level 1 variables	Description	Measurement/coding	Questionnaire items	Transformation
$DataPrivacy^{PC}$	The uploaded data is deleted after completing or aborting the e-audit process.	Assumes 1 if presented as available, 0 otherwise; randomized in each round.	-	Participant-centered*
$AuditCertainty^{PC}$	Conventional audits are prohibited for a business year already successfully audited via an e-audit.	Assumes 1 if presented as available, 0 otherwise; randomized in each round.	-	Participant-centered*
$Transparency^{PC}$	Taxpayers receive an audit protocol detailing how the e-audit result was obtained.	Assumes 1 if presented as available, 0 otherwise, randomized in each round.	-	Participant-centered*
$Independence^{PC}$	Taxpayers are permitted to utilize e-audits without the involvement of tax intermediaries.	Assumes 1 if presented as available, 0 otherwise; randomized in each round.	-	Participant-centered*
$Round^{PC}$	Captures the round in which participants responded to the presented e-audit process.	Index ranges from 1 (first round) to 5 (last possible round).	-	Participant-centered*
Level 2 variables				
$\overline{DataPrivacy}^{GMC}$	The uploaded data is deleted after completing or aborting the e-audit process.	Assumes 1 if presented as available, 0 otherwise; randomized in each round.	-	Participant average, grand-mean-centered†
$\overline{AuditCertainty}^{GM}$	Conventional audits are prohibited for a business year already successfully audited via an e-audit.	Assumes 1 if presented as available, 0 otherwise; randomized in each round.	-	Participant average, grand-mean-centered†
$\overline{Transparency}^{GMC}$	Taxpayers receive an audit protocol detailing how the e-audit result was obtained.	Assumes 1 if presented as available, 0 otherwise, randomized in each round.	-	Participant average, grand-mean-centered†
$\overline{Independence}^{GMC}$	Taxpayers are permitted to utilize e-audits without the involvement of tax intermediaries.	Assumes 1 if presented as available, 0 otherwise; randomized in each round.	-	Participant average, grand-mean-centered†
$Rounds^{GMC}$	The number of rounds completed by a participant.	Values from 1 to 5 assigned to each participant.	-	Grand-mean-centered†
$TrustBaseline^{GMC}$	Perceived trustworthiness of the Austrian tax authorities.	3-item scale from 1 (completely disagree) to 5 (completely agree); measured once at the beginning of the experiment.	- Austrian tax authorities are trustworthy - Austrian tax authorities have good intentions towards taxpayers. - Austrian tax authorities act in the interest of taxpayers.	Grand-mean-centered†

$PowerBaseline^{GMC}$	Perceived power of the Austrian tax authorities to enforce tax compliance.	3-item scale from 1 (completely disagree) to 5 (completely agree); measured once at the beginning of the experiment.	- Austrian tax offices have extensive means to enforce tax compliance. - Austrian tax authorities detect almost every irregularity in tax declarations. - Austrian tax authorities impose high penalties for tax evasion.	Grand-mean-centered†
$Sales^{GMC}$	Approximate sales (turnover) of participants' businesses.	One item from 1 (< 35,000 Euro) to 8 (> 1 Billion Euro); measured once at the beginning of the experiment (taxpayers only).		Grand-mean-centered†
$Employee^{GMC}$	Captures whether participants are owners or employees of their businesses.	One item, assumes 1 if participant is owner of the business, 0 otherwise; measured once at the beginning of the experiment (taxpayers only).		Grand-mean-centered†

Table 8: Independent variables used in the analysis. This table shows descriptions, original variable measurement and coding, as well as transformations for the multilevel models of all independent variables used in the analyses. *… see Equation 5 in Appendix 2; †… see Equation 6 in Appendix 2.

Dependent variables	Description	Measurement/coding	Questionnaire items
$BehavioralIntention$	Indicated probability of using, using or recommending utilization, or endorsing e-audit implementation among the groups of taxpayers, and tax auditors, respectively.	Probability in percentage points, steps of 5	
$TrustChange$	The change of trust in the authorities due to the presented e-audit.	3-item scale from -2 to+2	- Austrian tax offices are more/less trustworthy. - Austrian tax offices have better/worse intentions towards taxpayers. - Austrian tax offices act more/less in the interest of taxpayers.
$PowerChange$	The change of perceived power of the tax authorities due to the e-audit.	3-item scale from -2 to+2	- Austrian tax offices have more/less means to enforce tax compliance. - Austrian tax offices detect more/less irregularities in tax declarations. - Austrian tax offices impose higher/lower penalties for tax evasion.
$PerformanceExpectancy$	The change of perceived subjective benefits through the e-audit process.	One item from 1 (completely disagree) to 5 (completely agree)	- I believe the audit process offers advantages for me.
$CorrectResults$	Measures whether participants expected results from the presented e-audit process to be accurate.	One item from 1 (completely disagree) to 5 (completely agree)	- I believe the results of the audit process are correct.
$UncertaintyChange$	Measures whether participants perceive a positive or negative change in uncertainty in the tax system.	One item from -2 to +2	- Paying taxes in Austria is linked to more/less legal uncertainty.
$CostsChange$	measures whether participants expected a positive or negative change in compliance costs.	One item from -2 to +2	- Paying taxes in Austria is more/less costly.

Table 9: Dependent variables used in the analysis. This table shows descriptions, variable measurement and coding of all dependent variables used in the analyses, including robustness checks.

Appendix 2: Multilevel models, variance components, and variable transformations

Multilevel models with a random intercept

Equations 1 and 2 show the separate observation- and participant-level parts of a general random intercept model with one observation-level and one participant-level explanatory variable, with subscripts *j* and *i* denoting clusters (in our case, participants) and observations, respectively.

(1) $$Y_{ij} = \beta_j + \beta_1 X_{ij} + e_{ij}$$
$$e_{ij} \sim N(0, \sigma_e^2)$$

(2) $$\beta_j = \gamma_0 + \gamma_1 W_j + u_j$$
$$u_j \sim N(0, \sigma_u^2)$$

In Equation 1, observations of the dependent variable Y_{ij} on Level 1 are explained by the participant intercept β_j, a fixed (i.e., participant-invariant) effect β_1 of an observation-level explanatory variable X_{ij}, and the observation-level error e_{ij}. In Equation 2, the participant intercept β_j on Level 2 is modeled by the overall intercept γ_0, an effect γ_1 of a participant-invariant explanatory variable W_j, and the random error u_j, which reflects the deviation of each participant intercept β_j from the overall intercept. Substituting β_j in Equation 1 with the right side of Equation 2 results in the full random intercept model:

(3) $$Y_{ij} = \gamma_0 + \beta_1 X_{ij} + \gamma_1 W_j + u_j + e_{ij}$$
$$u_j \sim N(0, \sigma_u^2)$$
$$e_{ij} \sim N(0, \sigma_e^2)$$

In Equation 3, observations of the dependent variable Y_{ij} are thus explained by the overall observation intercept γ_0, a fixed effect β_1 of an observation-level explanatory variable X_{ij}, a fixed effect γ_1 of a participant-level explanatory variable W_j, the random participant-level error terms u_j with variance σ_u^2, and the random residual observation-level error e_{ij} with variance σ_e^2.

Variance components of dependent variables

The model in Equation 3 can be also reduced to a "null" model *without* the observation- and participant level explanatory variables X_{ij} and W_j:

(4) $$Y_{ij} = \gamma_0 + u_j + e_{ij}$$
$$u_j \sim N(0, \sigma_u^2)$$
$$e_{ij} \sim N(0, \sigma_e^2)$$

The null model in Equation 4 is used to estimate the baseline variance components σ_u^2 and σ_e^2 of the dependent variable Y_{ij}. These variance components are used to calculate the intraclass correlation coefficient (ICC) of the dependent variable as ICC = $\sigma_u^2/(\sigma_e^2 + \sigma_u^2)$. In our case, the ICC represents the correlation of responses by each participant, with high values indicating a high similarity between responses across rounds. Resulting variance components from the baseline models and the corresponding ICCs are presented in Table 10. For all four dependent variables in both groups, variances and ICCs suggest that both observation- and participant-level variation contribute a considerable proportion to the total variance, with ICCs ranging from .52 to .63. Multilevel analyses thus appear appropriate for all dependent variables.

Variables	σ_e^2	σ_u^2	ICC	Observations	Participants
		Taxpayers			
BehavioralIntention	454.33	678.66	.60	742	331
ChangeTrust	0.25	0.37	.60	742	331
ChangePower	0.18	0.30	.63	742	331
		Tax auditors			
BehavioralIntention	453.77	481.24	.52	1285	530
ChangeTrust	0.19	0.24	.56	1285	530
ChangePower	0.33	0.37	.53	1285	530

Table 10: Variance components and intraclass correlation coefficients of the dependent variables. This table shows the estimated variances between subjects (Level 1) and the residual within-subject variances (Level 2) of all dependent variables used in subsequent analyses. The intraclass correlation coefficient (ICC) reflects the correlation of values within participants, i.e. the similarity of the repeated responses by participants to the same scale (or item); it is calculated as the ratio of between-subject variance to total variance. Variances and ICCs are based on random-intercept baseline models without covariates, estimated with maximum likelihood estimation.

Variable transformations and models

In our case, the multilevel models include multiple observation- and participant-level explanatory variables. Because the four features were newly randomized in each round and thus varied both on the participant level (Level 2) as well as the observation level (Level 1), it was necessary to disaggregate their variance into these two levels. On Level 1, we thus centered each treatment variable (indicating availability of the respective feature) around the participant-means to remove Level 2 variance. On Level 2, we use the participant-mean of the treatment variable to remove Level 1 variance. Moreover, on Level 2, all explanatory variables are further centered around the grand mean of observations so that the model intercept reflects the overall mean of the dependent variable.

The original treatment variable *DataPrivacy,* for example*,* was transformed as follows, with the superscripts *PC* and *GMC* denoting participant-centering and grand-mean centering, respectively:

$$DataPrivacy_{ij}^{PC} = DataPrivacy_{ij} - \overline{DataPrivacy_j} \quad (5)$$

$$\overline{DataPrivacy_j}^{GMC} = \overline{DataPrivacy_j} - \overline{DataPrivacy} \quad (6)$$

To compute the participant-centered variable $DataPrivacy_{ij}^{PC}$ (Equation 5), we subtract the participant mean $\overline{DataPrivacy}_j$ from the original values of $DataPrivacy_{ij}$. To compute the grand-mean-centered variable $\overline{DataPrivacy}_j^{GMC}$ (Equation 6), we subtract the grand mean of observations $\overline{DataPrivacy}$ from the participant means $\overline{DataPrivacy}_j$. We conducted equivalent transformations of all Level 1 variables as shown in Equation 5, and of Level 2 variables as shown in Equation 6. The full model for the dependent variable *BehavioralIntention* for the group of taxpayers is shown in Equation 7, for the group of tax auditors in Equation 8. Models for the other two dependent variables *PowerChange,* and *TrustChange* are identical in the respective groups.

(7) $$BehavioralIntention_{ij} = \gamma_0 + \beta_1 DataPrivacy_{ij}^{PC} + \gamma_1 \overline{DataPrivacy}_j^{GMC} + \beta_2 AuditCertainty_{ij}^{PC} + \gamma_2 \overline{AuditCertainty}_j^{GMC} + \beta_3 Transparency_{ij}^{PC} + \gamma_3 \overline{Transparency}_j^{GMC} + \beta_4 Independence_{ij}^{PC} + \gamma_4 \overline{Independence}_j^{GMC} + \beta_5 Round_{ij}^{PC} + \gamma_5 Rounds_j^{GMC} + \gamma_6 TrustBaseline_j^{GMC} + \gamma_7 PowerBaseline_j^{GMC} + \gamma_8 Sales_j^{GMC} + \gamma_9 Employee_j^{GMC} + u_j + e_{ij}$$

$$u_j \sim N(0, \sigma_u^2)$$

$$e_{ij} \sim N(0, \sigma_e^2)$$

(8) $$BehavioralIntention_{ij} = \gamma_0 + \beta_1 DataPrivacy_{ij}^{PC} + \gamma_1 \overline{DataPrivacy}_j^{GMC} + \beta_2 AuditCertainty_{ij}^{PC} + \gamma_2 \overline{AuditCertainty}_j^{GMC} + \beta_3 Transparency_{ij}^{PC} + \gamma_3 \overline{Transparency}_j^{GMC} + \beta_4 Independence_{ij}^{PC} + \gamma_4 \overline{Independence}_j^{GMC} + \beta_5 Round_{ij}^{PC} + \gamma_5 Rounds_j^{GMC} + \gamma_6 TrustBaseline_j^{GMC} + \gamma_7 PowerBaseline_j^{GMC} + u_j + e_{ij}$$

$$u_j \sim N(0, \sigma_u^2)$$

$$e_{ij} \sim N(0, \sigma_e^2)$$

Appendix 3: Tables from additional tests and robustness checks

Group: Taxpayers	Dependent variables							
	Performance Expectancy		*Correct Results*		*Uncertainty Change*		*Costs Change*	
Fixed effects	*B*	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
	Level 1 (within participants)							
Intercept	2.86***	0.04	3.41***	0.05	0.08	0.05	0.28***	0.06
$DataPrivacy^{PC}$	0.19***	0.06	-0.03	0.06	-0.16**	0.07	-0.07	0.06
$AuditCertainty^{PC}$	0.22***	0.06	-0.02	0.05	-0.40***	0.07	-0.19***	0.06
$Transparency^{PC}$	0.01	0.06	0.06	0.06	-0.10	0.07	-0.05	0.06
$Independence^{PC}$	0.01	0.06	0.06	0.06	0.13*	0.07	-0.21***	0.06
$Round^{PC}$	0.00	0.03	-0.04*	0.03	0.05	0.03	0.00	0.03
	Level 2 (between participants)							
$\overline{DataPrivacy}^{GMC}$	0.14	0.12	-0.06	0.13	0.09	0.14	-0.15	0.16
$\overline{AuditCertainty}^{GMC}$	0.34***	0.12	-0.05	0.13	-0.30**	0.15	-0.22	0.16
$\overline{Transparency}^{GMC}$	0.02	0.11	0.01	0.12	-0.12	0.14	-0.14	0.15
$\overline{Independence}^{GMC}$	0.03	0.12	-0.03	0.13	0.09	0.14	-0.11	0.16
$Rounds^{GMC}$	-0.04	0.04	-0.06	0.04	0.02	0.04	0.06	0.05
$TrustBaseline^{GMC}$	0.26***	0.04	0.08*	0.05	-0.16***	0.05	-0.22***	0.06
$PowerBaseline^{GMC}$	0.00	0.05	0.07	0.06	-0.02	0.06	0.08	0.07
$Sales^{GMC}$	0.01	0.02	0.01	0.02	0.04	0.03	-0.02	0.03
$Employee^{GMC}$	0.10	0.09	-0.05	0.10	-0.28***	0.11	-0.17	0.12
Random effects	σ^2		σ^2		σ^2		σ^2	
Between variance (σ_u^2)	0.35		0.44		0.49		0.75	
Residual variance (σ_e^2)	0.34		0.33		0.58		0.43	
Observations	742		742		742		742	
Participants	331		331		331		331	

Table 11: Multilevel regressions in the group of taxpayers on the dependent variables *PerformanceExpectancy, CorrectResults, UncertaintyChange,* and *CostsChange*. The models include a random intercept which controls for between-subject variance, effectively disaggregating the variance of the dependent variable into Level 1 variance (within subjects, capturing the variation across rounds), and Level 2 variance (capturing the variation across participants). Variance of the four randomized treatments *DataPrivacy, AuditCertainty, Transparency*, and *Independence* (all being assigned the value 1 if the feature was presented as available, or 0 otherwise) was disaggregated by participant-mean centering (denoted by x^{PC}) on Level 1, and by using the participant means on Level 2 (denoted by $\bar{x}$). To facilitate interpretation of the intercept, all variables on Level 2 were entered as grand-mean-centered (denoted by x^{GMC}). The models were estimated using maximum likelihood estimation. *… p < .10, **… p < .05, ***… p < .01.

Group: Tax auditors	Dependent variables							
	Performance Expectancy		*Correct Results*		*Uncertainty Change*		*Costs Change*	
Fixed effects	*B*	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
				Level 1 (within participants)				
Intercept	3.20***	0.03	2.78***	0.04	-0.05	0.03	0.15***	0.04
$DataPrivacy^{PC}$	0.01	0.04	-0.09*	0.06	0.01	0.05	0.06	0.05
$AuditCertainty^{PC}$	0.11***	0.04	-0.57***	0.05	-0.05	0.05	0.01	0.05
$Transparency^{PC}$	0.13***	0.04	0.00	0.06	-0.02	0.05	-0.01	0.05
$Independence^{PC}$	0.00	0.04	0.04	0.06	0.08	0.05	-0.40***	0.05
$Round^{PC}$	-0.06***	0.02	0.03	0.02	-0.01	0.02	-0.02	0.02
				Level 2 (between participants)				
$\overline{DataPrivacy}^{GMC}$	0.06	0.09	-0.21**	0.11	0.02	0.10	0.06	0.11
$\overline{AuditCertainty}^{GMC}$	0.11	0.09	-0.26**	0.11	-0.16	0.10	-0.13	0.11
$\overline{Transparency}^{GMC}$	-0.06	0.09	-0.30***	0.11	0.13	0.10	0.05	0.11
$\overline{Independence}^{GMC}$	0.03	0.09	-0.04	0.10	-0.05	0.09	-0.31***	0.11
$Rounds^{GMC}$	-0.05**	0.02	-0.06**	0.03	-0.01	0.03	-0.03	0.03
$TrustBaseline^{GMC}$	0.05	0.04	-0.03	0.05	0.02	0.05	0.04	0.06
$PowerBaseline^{GMC}$	0.10**	0.04	0.35***	0.05	-0.04	0.04	-0.09*	0.05
Random effects	σ^2		σ^2		σ^2		σ^2	
Between variance (σ_u^2)	0.29		0.36		0.29		0.51	
Residual variance (σ_e^2)	0.33		0.60		0.49		0.46	
Observations	1285		1285		1285		1285	
Participants	530		530		530		530	

Table 12: Multilevel regressions in the group of tax auditors on the dependent variables *PerformanceExpectancy, CorrectResults, UncertaintyChange,* and *CostsChange*. The models include a random intercept which controls for between-subject variance, effectively disaggregating the variance of the dependent variable into Level 1 variance (within participants, capturing the variation across rounds), and Level 2 variance (capturing the variation across participants). Variance of the four randomized treatments *DataPrivacy, AuditCertainty, Transparency*, and *Independence* (all being assigned the value 1 if the feature was presented as available, or 0 otherwise) was disaggregated by participant-mean centering (denoted by x^{PC}) on Level 1, and by using the participant means on Level 2 (denoted by $\bar{x}$). To facilitate interpretation of the intercept, all variables on Level 2 were entered as grand-mean-centered (denoted by x^{GMC}). The models were estimated using maximum likelihood estimation. *… p < .10, **… p < .05, ***… p < .01.

Group: Taxpayers	Dependent variables					
	Behavioral Intention		*TrustChange*		*PowerChange*	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	18.97***	2.10	-0.29***	0.05	0.31***	0.04
DataPrivacy	11.48***	1.67	0.20***	0.04	-0.03	0.05
AuditCertainty	13.59***	2.08	0.18***	0.05	-0.01	0.05
Transparency	5.96***	1.91	0.05	0.05	0.06	0.03
Independence	4.35**	2.12	0.02	0.05	0.02	0.04
Participant fixed effects	Yes		Yes		Yes	
Round fixed effects	Yes		Yes		Yes	
Observations	742		742		742	
Participants	331		331		331	

Table 13: Fixed effects regressions using the full sample from taxpayers on the dependent variables *BehavioralIntention*, *TrustChange*, and *PowerChange*. The models include dummy variables for participant and round intercepts which controls for between-subject and between-round variance. Coefficients thus only capture the effects of feature changes across rounds. Features *DataPrivacy, AuditCertainty, Transparency*, and *Independence* were entered as dummy variables, assigned 1 if the feature was presented as available, or 0 if unavailable. Reported standard errors are participant-cluster robust. *… p < .10, **… p < .05, ***… p < .01.

Group: Tax auditors	Dependent variables					
	Behavioral Intention		*TrustChange*		*PowerChange*	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	57.26***	1.69	0.13***	0.04	0.09**	0.04
DataPrivacy	-0.18	1.43	0.05	0.03	-0.06	0.04
AuditCertainty	-15.41***	1.82	0.05	0.04	-0.43***	0.05
Transparency	-0.07	1.44	0.12***	0.03	-0.04	0.04
Independence	-1.40	1.50	-0.02	0.03	0.03	0.04
Participant fixed effects	Yes		Yes		Yes	
Round fixed effects	Yes		Yes		Yes	
Observations	1285		1285		1285	
Participants	530		530		530	

Table 14: Fixed effects regressions using the full sample from tax auditors on the dependent variables *BehavioralIntention*, *TrustChange*, and *PowerChange*. The models include dummy variables for participant and round intercepts which controls for between-subject and between-round variance. Coefficients thus only capture the effects of feature changes across rounds. Features *DataPrivacy, AuditCertainty, Transparency*, and *Independence* were entered as dummy variables, assigned 1 if the feature was presented as available, or 0 otherwise. Reported standard errors are participant-cluster robust. *… p < .10, **… p < .05, ***… p < .01.

Group: Taxpayers	Dependent variables					
	Behavioral Intention		*TrustChange*		*PowerChange*	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	22.67***	2.10	-0.29***	0.06	0.33***	0.06
DataPrivacy	11.35***	2.00	0.23***	0.06	-0.06	0.06
AuditCertainty	9.06***	2.04	0.17***	0.06	0.04	0.05
Transparency	4.04*	2.15	0.08	0.06	0.04	0.05
Independence	3.78*	2.04	-0.01	0.06	0.03	0.05
Participant fixed effects	Yes		Yes		Yes	
Round fixed effects	Yes		Yes		Yes	
Observations	592		592		592	
Participants	331		331		331	

Table 15: Fixed effects regressions using the first two rounds from taxpayers on the dependent variables *BehavioralIntention*, *TrustChange*, and *PowerChange*. The models include dummy variables for participant and round intercepts which controls for between-subject and between-round variance. Coefficients thus only capture the effects of feature changes across rounds. Features *DataPrivacy, AuditCertainty, Transparency*, and *Independence* were entered as dummy variables, assigned 1 if the feature was presented as available, or 0 otherwise. Reported standard errors are participant-cluster robust. *… p < .10, **… p < .05, ***… p < .01.

Group: Tax auditors	Dependent variables					
	Behavioral Intention		*TrustChange*		*PowerChange*	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	56.77***	2.03	0.18***	0.04	0.01	0.06
DataPrivacy	-1.73	1.84	0.05	0.04	0.00	0.05
AuditCertainty	-11.67***	1.91	0.06	0.04	-0.30***	0.06
Transparency	1.11	1.73	0.08**	0.04	-0.04	0.05
Independence	-1.52	1.75	-0.07*	0.04	0.04	0.05
Participant fixed effects	Yes		Yes		Yes	
Round fixed effects	Yes		Yes		Yes	
Observations	971		971		971	
Participants	530		530		530	

Table 16: Fixed effects regressions using the first two rounds from tax auditors on the dependent variables *BehavioralIntention*, *TrustChange*, and *PowerChange*. The models include dummy variables for participant and round intercepts which controls for between-subject and between-round variance. Coefficients thus only capture the effects of feature changes across rounds. Features *DataPrivacy, AuditCertainty, Transparency*, and *Independence* were entered as dummy variables, assigned 1 if the feature was presented as available, or 0 otherwise. Reported standard errors are participant-cluster robust. *… p < .10, **… p < .05, ***… p < .01.

Group: Taxpayers	Dependent variables					
	$\overline{BehavioralIntention}$		$\overline{TrustChange}$		$\overline{PowerChange}$	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	30.64***	5.11	-0.31***	0.12	0.28***	0.10
$\overline{DataPrivacy}$	1.38	4.73	0.11	0.11	-0.05	0.10
$\overline{AuditCertainty}$	10.54**	4.90	0.25**	0.11	0.06	0.10
$\overline{Transparency}$	4.64	4.59	0.08	0.11	0.01	0.09
$\overline{Independence}$	-2.41	4.70	0.05	0.11	0.13	0.10
Averaged observations	742		742		742	
Observations in model (= participants)	331		331		331	

Table 17: Regressions on *BehavioralIntention*, *TrustChange*, and *PowerChange* using mean values of dependent and independent variables from the full sample of taxpayers. All variables included in the models are mean values of variables across rounds (denoted by $\bar{x}$). Coefficients thus only capture the effects of the average treatment manifestation on the average response by participants. *… p < .10, **… p < .05, ***… p < .01.

Group: Tax auditors	Dependent variables					
	$\overline{BehavioralIntention}$		$\overline{TrustChange}$		$\overline{PowerChange}$	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	54.99***	3.44	0.14*	0.08	0.20**	0.09
$\overline{DataPrivacy}$	-4.84	3.31	0.01	0.07	-0.21**	0.09
$\overline{AuditCertainty}$	-5.50*	3.34	0.08	0.07	-0.16*	0.09
$\overline{Transparency}$	-3.45	3.29	-0.08	0.07	-0.20**	0.09
$\overline{Independence}$	-1.30	3.25	0.06	0.07	-0.10	0.09
Averaged observations	1285		1285		1285	
Observations in model (= participants)	530		530		530	

Table 18: Regressions on *BehavioralIntention*, *TrustChange*, and *PowerChange* using mean values of dependent and independent variables from the full sample of tax auditors. All variables included in the models are mean values of variables across rounds (denoted by $\bar{x}$). Coefficients thus only capture the effects of the average treatment manifestation on the average response by participants. *… p < .10, **… p < .05, ***… p < .01.

Group: Taxpayers	Dependent variables					
	Behavioral Intention		*TrustChange*		*PowerChange*	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	30.69***	3.98	-0.33***	0.09	0.33***	0.09
DataPrivacy	4.94	3.52	0.30***	0.08	-0.01	0.08
AuditCertainty	11.59***	3.53	0.26***	0.08	-0.03	0.08
Transparency	6.30*	3.53	0.13	0.08	0.03	0.08
Independence	-7.97**	3.54	-0.11	0.08	0.06	0.08
Observations in model (= participants)	331		331		331	

Table 19: Regressions on *BehavioralIntention*, *TrustChange*, and *PowerChange* using the first round only from taxpayers. All variables are entered as the original values from the first round of each participant. *… p < .10, **… p < .05, ***… p < .01.

Group: Tax auditors	Dependent variables					
	Behavioral Intention		*TrustChange*		*PowerChange*	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	56.20***	2.83	0.12*	0.06	0.04	0.08
DataPrivacy	-4.51*	2.54	0.04	0.06	-0.14*	0.07
AuditCertainty	-8.53***	2.54	0.07	0.06	-0.18**	0.07
Transparency	-2.54	2.54	0.03	0.06	-0.12	0.07
Independence	3.16	2.54	0.09	0.06	0.11	0.07
Observations in model (= participants)	530		530		530	

Table 20: Regressions on *BehavioralIntention*, *TrustChange*, and *PowerChange* using the first round only from tax auditors. All variables are entered as the original values from the first round of each participant. *… p < .10, **… p < .05, ***… p < .01.

Appendix 4: Experimental survey on E-Audits

In the following sections, some questions were (not) shown depending on previous answers. For the purpose of readability, these alternative questions are printed in grey. Also printed in grey are headings of question blocks which were not visible to participants. The original survey was in German language.

Beginning of Block: Introduction

Dear participant,

in a research project at the ###University### (Prof. ###), we are currently conducting a survey concerning "tax audits in Austria". In this survey, we inquire about motivations and opinions about Austrian tax authorities and the tax audit methods used. Therefore, we would be glad to hear your opinion on that topic.
The survey is conducted by ###University### and all answers are strictly anonymous. Answers cannot be traced back to individuals. After the survey is concluded, the data will be used for scholarly purposes. The aggregated results will also be used for the political debate to enhance future tax audits. Your participation is, thus, very valuable. Completing the survey will take 10-15 minutes.

If you have any questions concerning the survey, please feel free to contact us via ### @###.at.
Thank you for your participation!

End of Block: Introduction

Beginning of Block: Demographics

Please choose your gender.

- ○ Female
- ○ Male

What is your age?

- ○ under 20
- ○ 20-29
- ○ 30-39
- ○ 40-49
- ○ 50-59
- ○ 60-69
- ○ over 69

What is your occupation (multiple selections possible)?

- ◯ Officer of the financial authorities
- ◯ Entrepreneur
- ◯ Tax advisor
- ◯ Landlord
- ◯ Employee

Do you have a tax related position in your company?

- ◯ Yes, on the board of directors
- ◯ Yes, as employee
- ◯ Yes, in research
- ◯ No

Do you conduct a tax related activity?

- ◯ Yes, as self-employed tax advisor
- ◯ Yes, as employee in a tax advisory company
- ◯ Yes, I'm a tax expert in a company, which **doesn't** offer tax advisory services
- ◯ No

End of Block: Demographics

Beginning of Block: Income/Advisor/Audit

Which sources of income did you have in 2018? (multiple selection possible)

- ◯ Income from agriculture and forestry
- ◯ Income from self-employment
- ◯ Income from trade operations
- ◯ Income from employment
- ◯ Income from capital assets
- ◯ Income from renting and leasing
- ◯ Other income

Which legal form does your enterprise have?
Which legal form does the enterprise you work for have?

- ◯ Sole entrepreneur
- ◯ Civil law company (GesbR)
- ◯ General partnership (OG)
- ◯ Limited partnership (KG)
- ◯ Limited partnership with a limited liability company as partner (GmbH & Co KG)
- ◯ Limited liability company (GmbH)
- ◯ Corporation (AG)
- ◯ Other (e.g. Society, Cooperative, etc.)

Please indicate the turnover of your enterprise in 2018 (according to the VAT Act).
Please indicate the turnover of the enterprise you work for in 2018 (according to the VAT Act).
Please indicate your turnover 2018 from income from renting and leasing.

- ○ below € 35.000
- ○ between € 35.000 and € 100.000
- ○ between € 100.000 and € 220.000
- ○ between € 220.000 and € 700.000
- ○ between € 700.000 and € 10 millions
- ○ between € 10 millions and € 40 Millions
- ○ between € 40 millions and € 200 Millions
- ○ between € 200 millions and € 1 billion
- ○ more than € 1 billion

Do you use the services of a tax advisor or accountant? (multiple selection possible)
Does the company you work for use the services of a tax advisor or accountant? (multiple selection possible)

- ○ Tax advisor
- ○ Accountant

Please indicate your knowledge in Austrian tax law on a scale from 1 (layperson) to 7 (expert)?

	1	2	3	4	5	6	7	
layperson	○	○	○	○	○	○	○	expert

Please indicate your knowledge in accounting on a scale from 1 (layperson) to 7 (expert)?

	1	2	3	4	5	6	7	

layperson	○	○	○	○	○	○	○	expert

Did you ever experience a tax audit in your enterprise?
Were you ever involved in a tax audit in the company you work for?

- ○ No
- ○ Yes

Which sort of tax audit did your enterprise experience? (multiple selection possible)
Which sort of tax audit did the enterprise you work for experience? (multiple selection possible)

- ○ Full in-person tax audit (Außenprüfung)
- ○ Paper tax audit
- ○ Other _____

End of Block: Income/Advisor/Audit

Beginning of Block: Message Role

Depending on the answers given above, each participant was assigned the most suitable role for the remainder of the survey.

Please answer all following questions from your point of view as an **entrepreneur**.
Please answer all following questions from your point of view as a **landlord**.
Please answer all following questions from your point of view as an **employee of the tax authorities.**
Please answer all following questions from your point of view as an **employee of the company you work for.**
Please answer all following questions from your point of view as a **tax advisor.**

End of Block: Message Role

Beginning of Block: Baseline

How strongly do you agree with the following statements?

Austrian tax offices…

	Completely disagree				Completely agree
	1	2	3	4	5
...are trustworthy.	○	○	○	○	○
…have good intentions towards taxpayers.	○	○	○	○	○
...act in the interest of taxpayers.	○	○	○	○	○
...have extensive means to enforce tax compliance.	○	○	○	○	○
...detect almost every irregularity in tax declarations.	○	○	○	○	○
...impose high penalties for tax evasion.	○	○	○	○	○
...are competent.	○	○	○	○	○
...work efficiently.	○	○	○	○	○
...have extensive expert knowledge.	○	○	○	○	○

Paying taxes in Austria...

	Completely disagree				Completely agree
	1	2	3	4	5
...is complicated	○	○	○	○	○
...requires a lot of work.	○	○	○	○	○
...is very costly.	○	○	○	○	○
...is linked to high legal uncertainty.	○	○	○	○	○

I pay my taxes correctly...

	Completely disagree				Completely agree
	1	2	3	4	5
...as a matter of course.	○	○	○	○	○
...because it is my duty as a citizen.	○	○	○	○	○
...to support the state and its citizens.	○	○	○	○	○
...because the risk of being audited is too high.	○	○	○	○	○
...because tax evasion is severely punished.	○	○	○	○	○
...because tax evasion is almost always detected.	○	○	○	○	○

End of Block: Baseline

Beginning of Block: Scenario

The Austrian Ministry of Finance is planning the introduction of a digital, alternative form of tax audits. We would like to know, how you perceive that audit process.

- Taxpayers can voluntarily use the planned digital audit process.
- In the process, detailed accounting data can be uploaded to the financial authorities electronically via FinanzOnline.
- To use the process, it is necessary that the books are kept with a qualified bookkeeping system (e.g. BMD, RZL, DATEV, DVO, etc.)
- The uploaded data is then automatically audited.
- If the system identifies irregularities, further inquiries are automatically generated and clarifying information can be uploaded.
- The process is finished as soon as all questions concerning irregularities have been answered or if no irregularities were detected.
- The process can be aborted by taxpayers at any time.
- Data from the audit process can be used to automatically assess the taxes due.

Moreover, the audit process has four special features, which you find below. Please read them carefully:

Availability of each of the following four features was randomized.

Data Privacy: Yes
After finishing the audit process, all data supplied to the tax authorities will be deleted permanently.

Data Privacy: No
Accounting data provided by the taxpayer will be stored by the tax authorities. Data will not be deleted, even if the audit process is aborted.

Transparency: Yes
After finishing the audit process, taxpayers receive information about how the audit result was generated.

Transparency: No
Taxpayers are only informed about the result of the digital audit. No additional information about the audit process is provided.

Audit Certainty: Yes
After a tax return has been successfully generated based on the uploaded accounting data, future tax audits for the respective year of assessment are prohibited. This only applies if potential irregularities in the accounting data can be clarified online.

Audit Certainty: No
Even if a tax return has been successfully generated in the digital audit process, a conventional tax audit can still take place at a later time.

Independence: Yes
Taxpayers may use the process independently and without the assistance of tax professionals.

Independence: No
To use the digital audit process, taxpayers need to be represented by a tax advisor, because only tax advisors can upload accounting data.

The following question was displayed according to the role assigned to participants.

How likely would you use the described audit process for your next tax declaration? (in percent)
How likely would you use or recommend utilization of the described digital audit process for the tax declaration of your company or the company you work for? (in percent)
How likely would you endorse the described digital audit process? (in percent)
How likely would you recommend your clients using the described digital audit process? (in percent)

Slider (0-100%)	

How strongly do you agree with the following statements concerning the described audit process?

	Completely disagree				Completely agree
	1	2	3	4	5
I believe the audit process is easy to use.	○	○	○	○	○
I believe the audit process offers advantages for me.	○	○	○	○	○
I believe I will receive sufficient support from the financial authorities using the process.	○	○	○	○	○
I believe the results of the audit process are correct.	○	○	○	○	○

How would your attitude change if the described audit process was introduced?

Austrian tax offices...

	–		No change **0**		+	
...are **less trustworthy**.	○	○	○	○	○	...are **more trustworthy**.
…have **worse intentions** towards taxpayers.	○	○	○	○	○	…have **better intentions** towards taxpayers.
...act **less in the interest** of taxpayers.	○	○	○	○	○	...act **more in the interest** of taxpayers.
...have **less means to enforce** tax compliance.	○	○	○	○	○	...have **more means to enforce** tax compliance.
...detect **less irregularities** in tax declarations.	○	○	○	○	○	...detect **more irregularities** in tax declarations.
...impose **lower punishments** for tax evasion.	○	○	○	○	○	...impose **higher punishments** for tax evasion.
...are **less competent**.	○	○	○	○	○	...are **more competent**.
...work **less efficiently**.	○	○	○	○	○	...work **more efficiently**.
...have **less extensive expert knowledge**.	○	○	○	○	○	...have **more extensive expert knowledge**.

How would your assessment change, if the described audit process was introduced?

Paying taxes in Austria…

	–		no change **0**		+	
...is **less** complicated**..**	○	○	○	○	○	...is **more** complicated.
...requires **less** additional work.	○	○	○	○	○	...requires **more** additional work.
...is **less** costly.	○	○	○	○	○	...is **more** costly.
...is linked to **less** legal uncertainty.	○	○	○	○	○	...is linked to **more** legal uncertainty.

End of Block: Scenario

Beginning of Block: Continue Block 1

You finished evaluating the first scenario of the digital audit process.

Subsequently, you will find another variation of the audit process, in which only the four special features change (Data Privacy, Transparency, Audit Certainty, Independence).

The questions for evaluating the audit process remain unchanged.

End of Block: Continue Block 1

Beginning of Block: Continue Block 2

You finished evaluating two variations of the digital audit process. Would you like to continue evaluating another variation? The more variations you evaluate, the better we can capture your assessments, which would help us a lot. You can finish the survey after each variation.

In the next variation, only the four special features will change (Data Privacy, Transparency, Audit Certainty, Independence).

The questions for evaluating the audit process remain unchanged.

- ○ YES, I would like to evaluate another variation.
- ○ NO, I want to finish the survey.

End of Block: Continue Block 2

Beginning of Block: Continue Block 3

You finished evaluating three variations of the digital audit process. Would you like to continue evaluating another variation? You can finish the survey after each variation.

In the next variation, only the four special features will change (Data Privacy, Transparency, Audit Certainty, Independence).

The questions for evaluating the audit process remain unchanged.

- ○ YES, I would like to evaluate another variation.
- ○ NO, I want to finish the survey.

End of Block: Continue Block 3

Beginning of Block: Continue Block 4

You finished evaluating four variations of the digital audit process. Would you like to continue evaluating another variation? You can finish the survey after each variation.

In the next variation, only the four special features will change (Data Privacy, Transparency, Audit Certainty, Independence).

The questions for evaluating the audit process remain unchanged.

- ○ YES, I would like to evaluate another variation.
- ○ NO, I want to finish the survey.

End of Block: Continue Block 4

Beginning of Block: Open Questions

To what extent were you already familiar with the topic „digital audit processes of book accounts“ before this survey? (e.g. SAF-T)

	1	2	3	4	5	6	7	
Not at all familiar	○	○	○	○	○	○	○	Very familiar

What did you particularly like about the described new audit process? Please enter up to 5 positive aspects in the fields below.

○ 1._____

○ 2._____

○ 3._____

○ 4._____

○ 5._____

Which concerns do you have about the described new audit process? Please enter up to 5 concerns in the fields below.

○ 1._____

○ 2._____

○ 3._____

○ 4._____

○ 5._____

What would you wish for in the new audit process? Please enter up to 5 whishes in the fields below.

- 1._____
- 2._____
- 3._____
- 4._____
- 5._____

End of Block: Open Questions